Federal Emergency Management Agency

Information Technology Architecture

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Appendices

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List of Appendices

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Appendix A Acronyms, Terms, and Definitions

ACE	Automated Construction Estimate System
ACH	Automated Clearing House
ADA	*Americans with Disabilities Act*
ADAMS	Automated Disaster Assistance Management System
ADD	Automated Deployment Data Base
AML	ARC Macro Language
ANSI	American National Standards Institute
APP	Application Portability Profile
ARC	American Red Cross
ASCII	American Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
AVI	Audio-Visual Interleave
BFE	Base Flood Elevation
BMP	Bitmap Format
BPR	Business Process Re-engineering
CAD	Computer-Aided Design
CAM	Computer-Aided Manufacturing
CAP	Corrective Action Program
CAR	Capability Assessment for Readiness
CASE	Computer Aided Software Engineering
CBT	Computer Based Training
CCA	Comprehensive Cooperative Agreement
CCB	Configuration Control Board
CCITT	Consultative Committee for International Telephony and Telegraphy
CD ROM	Compact Disk Read-Only Memory
CDRG	Catastrophic Disaster Response Group
CEM	Comprehensive Emergency Management
CERCLA	*Comprehensive Environmental, Response, Compensation, and Liability Act*
CFO	Chief Financial Office
CFR	Code of Federal Regulations
CGI	Common Gateway Interface
CGM	Computer Graphics Metafile
CIAO	Chief Infrastructure Assurance Officer
CID	Community Identification
CIMS	Correspondence and Issues Management System
CIO	Chief Information Officer
CIP	Critical Infrastructure Protection
CM	Configuration Management
CMS	Call Management System
CN	Communications Network

COBRA	*Coastal Barrier Resources Act*
COG	Continuity of Government
COOP	Continuity of Operations
COTS	Commercial-Off-The-Shelf
CRS	Community Rating System
CSEPP	Chemical Stockpile Emergency Preparedness Program
CTI	Computer Telephony Integration
CWSI	Cisco Works for Switched Networks
DA	Department of the Army
DAE	Disaster Assistance Employee
DAMAGES	Disaster Accountability Management System
DARIS	Disaster Automated Reporting and Information System
DARPA	Defense Advanced Research Projects Agency
DBA	Data Base Administrator
DBMS	Data Base Management System
DFIRM	Digital Flood Insurance Rate Map
DFIRM-DLG	Digital Flood Insurance Rate Map - Digital Line Graph
DFO	Disaster Field Office
DGSA	DOD Goal Security Architecture
DIS	Distributed Interactive Simulation
DLG	Digital Line Graph
DMS	Document Management System
DOD	Department of Defense
DOL	Department of Labor
DOS	Disk Operating System
DSA	Digital Standard Algorithm
DSR	Disaster Survey Report
DSS	Digital Signature Standard
DTD	Document Type Definition
DVD	Digital Versatile Disk
DXF	Drawing Exchange Format
EAS	Emergency Alert System
EBT	Electronic Benefits Transfer
EC	Emergency Coordination; or Electronic Commerce
EDI	Electronic Data Interchange
EDIFACT	EDI for Administration, Commerce, and Transport
EDPP	Electronic Design and Pre-Press
EEI	Essential Elements of Information
EFT	Electronic Funds Transfer
EIMA	Emergency Information and Media Affairs
EIS	Emergency Information System
EMI	Emergency Management Institute
EMT	Emergency Management Training
EO	Executive Order

EOC	Emergency Operations Center
EPS	Encapsulated Postscript
ERM	Elevation Reference Mark
ERT	Emergency Response Team
ERT-A	Emergency response Team – Advance Element
ES	Emergency Support; or End System
ESF	Emergency Support Function
EST	Emergency Support Team
FACMAN	Facilities Management System
FCO	Federal Coordinating Officer
(F)EDI	Financial EDI
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FIA	Federal Insurance Administration
FIPS	Federal Information Processing Standard
FIRM	Flood Insurance Rate Map
FIRM-DLG	Flood Insurance Rate Map - Digital Line Graph
FIRMPD	FEMA Information Resources Management Procedural Directive
FRA	*Federal Records Act*
FRERP	Federal Radiological Emergency Response Plan
FRP	Federal Response Plan
FSN	FEMA Switched Network
FTS	Federal Telecommunications System
GIF	Graphics Interchange Format
GIS	Geographic Information System
GPRA	*Government Performance and Results Act*
GPS	Global Positioning System
GSA	General Services Administration
HF	High Frequency
HHS	Health and Human Services
HP	Hewlett-Packard
HPCC	High-performance computing and communications
HQ	Headquarters
HS	Human Services
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
I/O	Input/Output
IAEGC	Interagency Electronic Grants Working Group
ICPAE	Interagency Committee on Public Affairs in Emergencies
IC&V	Intelligent Collaboration and Visualization
IETF	Internet Engineering Task Force
IFMIS	Integrated Financial Management Information System

IFSAR	Interferometric Synthetic Aperture Radar
IGES	Initial Graphics Exchange Specification
IGRP	Interior Gateway Routing Protocol
IMAP	Interactive Mail Access Protocol
IMS	Image Management System
IP	Internet Protocol
IPX	Internetwork Packet Exchange
IRB	Information Resources Board
IRS	Internal Revenue Service
IS	Information System; or Infrastructure Support
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ISP	Internet Service Provider
ISPAG	Information Systems Policy Advisory Group
IT	Information Technology
ITA	Information Technology Architecture
ITMRA	*Information Technology Management Reform Act*
ITS	Information Technology Services
ITU	International Telegraphic Union
IVR	Interactive Voice Response
JAD	Joint Application Development
JPEG	Joint Photographic Experts Group
LAN	Local Area Network
LCS	Local Communications System
LDAP	Light Directory Access Protocol
LIDAR	Light Detection and Ranging
LIMS	Logistics Information Management System
LISTSERV	List Server
LMI	Logistics Management Institute
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
LSE	Local Subscriber Environment
MAC	Map Analysis Center
MATTS	Mobile Air Transportable Telecommunications System
MERS	Mobile Emergency Response Support
MIDI	Musical Instrument Device Interface
MIME	Multi-purpose Internet Mail Extensions
M-JPEG	Motion JPEG
MOA	Memorandum of Agreement
MOC	MERS Operations Center
MOU	Memorandum of Understanding
MRC	Monthly Recurring Costs

MSC	Map Service Center
MT	Mitigation Directorate
MWEAC	Mount Weather Emergency Action Center
NARA	National Archives and Records Administration
NAWAS	National Warning System
NCS	National Communications System
NECC	National Emergency Coordination Center
NEHRP	National Earthquake Hazards Reduction Program
NEMA	National Emergency Management Association
NEMIS	National Emergency Management Information System
NETC	National Emergency Training Center
NFA	National Fire Academy
NFIP	National Flood Insurance Program
NFIRA	*National Flood Insurance Reform Act*
NFIRS	National Fire Incident Reporting System
NGI	Next Generation Internet
NII/GII	National Information Infrastructure/Global Information Infrastructure Initiatives
NIST	National Institute of Standards and Technology
NMD	National Mapping Division (of USGS)
NNOB	National Network Operations Branch
NOAA	National Oceanic and Atmospheric Agency
NPR	National Performance Review
NRC	Nuclear Regulatory Commission
NS	Office of National Security Affairs
NSA	National Security Agency
NT	Network technology; or Windows NT operating system
NTA	Network Technology Architecture
NWC	National Warning Center
NWS	National Weather Service
O&M	Operations and Maintenance
OCLA	Office of Congressional Liaison and Affairs
OCR	Optical Character Recognition
OER	Office of Equal Rights
OFM	Office of Financial Management
OGC	Office of the General Counsel
OHRM	Office of Human Resources Management
OIG	Office of the Inspector General
OLAP	On-Line Analytical Processing
OLE	Object Linking and Embedding
OLTP	On-Line Transaction Processing
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OSD	Operations Support Directorate

OSI	Open Systems Interconnect
OSPF	Open Shortest Path First
OSTP	Office of Science and Technology Policy
PBX	Private Branch Exchange
PC	Personal Computer
PCS	Personal Communications System
PDA	Preliminary Damage Assessment
PDF	Portable Document Format
PGP	Pretty Good Privacy
PKI	Public Key Infrastructure
PMG	Program Management Group
PNG	Portable Network Graphics
POP-3	Post Office Protocol (Version 3)
PPA	Performance Partnership Agreement
PSN	Public Switched Network
PT&E	Preparedness, Training, and Exercises Directorate
PVC	Permanent Virtual Circuits
Q3	Quality Level 3
QA/QC	Quality Assurance/Quality Control
QoS	Quality of Service
R&R	Response and Recovery
RCS	Routing Control System
RDBMS	Relational Data Base Management System
REP	Radiological Emergency Preparedness
RIP	Routing Information Protocol
RLE	Run Length Encoding
ROC	Regional Operations Center
RS	Relay System
RSA	Rivest-Shamir-Adelman
SAIC	Science Applications International Corporation
SAR	Search and Rescue
SATCOM	Satellite Communications
SBA	Small Business Administration
SDTS	Spatial Data Transfer Standard
SEI	Software Engineering Institute
SFHA	Special Flood Hazard Area
SGML	Standard Generalized Markup Language
SHA	Secure Hash Algorithm
SITREP	Situation Report
SLA	Service Level Agreement
S/MIME	Secure MIME
SMTP	Simple Mail Transfer Protocol

SONET	Synchronous Optical Network
SOW	Statement of Work
SPM	System Programming and Maintenance
SQL	Structured Query Language
SSL	Secure Sockets Layer
SVC	Switched Virtual Circuits
TAFIM	Technical Architecture Framework for Information Management
TAP	Task Analysis Plan
TCP	Transmission Control Protocol
TIFF	Tagged Image File Format
TIGER	Topologically Integrated Geographic Encoding and Referencing
TIN	Tax Identification Number
TRM	Technical Reference Model
TS	Transfer System
USFA	United States Fire Administration
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VLAN	Virtual LAN
VOLAG	Voluntary Agency
VPN	Virtual Private Network
VR	Virtual Reality
VRML	Virtual Reality Modeling Language
VTC	Video Tele-conferencing
WAN	Wide Area Network
WMF	Windows Metafile
WYO	Write Your Own
WYOP	Write Your Own Program
WYSIWYG	What You See Is What You Get
XML	Extensible Markup Language
Y2K	Year 2000

Terms and Definitions

Architectural Component – An architectural component is a high-level building block or piece of a larger system that can be used and re-used across multiple systems in a cost effective and standardized manner. Architectural components are sometime referred to as *middleware* or the basic building blocks of IT systems. Architectural components comprise the basic FEMA IT and network infrastructure. Architectural components broadly include: information technology standards, hardware, networks, software, processes, environmental factors, partnerships and relationships, data stores, documents, common business function requirements, technologies, and tools which are used to build systems or are used within a system.

Technical Reference Model (TRM) – A TRM is a model that provides the basic ground rules, set of standards, or *building code* for designing, developing, implementing, testing, and integrating IT systems. The TRM identifies and describes the basic information services (such as data base services, document management services, security services, etc.) at a high level and how they ought to be designed and constructed in a uniform and standardized manner.

Standards Profile – A standards profile defines how a particular standard such as an open systems standard, an industry standard, or a standard tool needs to be customized or tailored to support interchange or interoperability. A standards profile recognizes that all major standards generally need to be customized or profiled through establishment of user conventions. These profiles or user conventions are frequently referred to as *Application Portability Profiles (APPs).*

Standards Profiles (plural) – refers to more than one standard profile; generally a set of standards.

Standard Tool – A standard tool is defined to be an IT tool, system, or application which FEMA has determined to meet operational requirements in a standardized and appropriate manner and is mandated for use in IT systems. A standard tool is part of the IT Architecture.

Security Services Model – This is the Technical Reference Model for security services (such as access controls, confidentiality, fault tolerance, originator authentication, etc.)

Security Standards Profile – This profile is the same as a standards profile except that it refers to security standards.

Appendix B References

This appendix lists references that were consulted during the development of the *FEMA IT Architecture*. Appendix C provides additional specific references to FEMA in public law, rules and regulations, and directives. Appendix I provides additional references to Executive Directives, public law, and judicial guidance impacting the development of the *FEMA IT Architecture* (in general).

1. *Strategic Plan, FY 1998 through FY 2007, With Operational Objectives through FY-2003, Partnership for a Safer Future*, FEMA, September 30, 1997.

2. *Financial Management Status Report and Five-Year Plan*, FEMA, September 1997.

3. *Facility Management & Campus/Course Administration Alternative Analysis*, FEMA, December 30, 1997.

4. *Technical Approach Plan (TAP) for Federal Emergency Management Agency Information Technology Architecture*, FEMA, March 30, 1998.

5. *Strategic Plan*, CIO Council, January 1998.

6. *Information Technology Architectural Framework*, FEMA, October 31, 1994.

7. *National Emergency Management Information System (NEMIS), Initial Version 2, Analysis and Plan*, FEMA, July 3, 1997.

8. *Annual Performance Plan, Fiscal Year 1999*, FEMA, February 26, 1998.

9. *National Mitigation Strategy*, FEMA, available at http://www.fema.gov

10. *Federal Response Plan*, FEMA, available at http://www.fema.gov

11. *Federal Response Planning Guidance, FRPG 02-95, Framework for Interagency Federal Response Planning*, FEMA, September 1995.

12. *Information Resources Management Policy and Procedural Directive (FIRMPD), Information Systems Safeguards*, FEMA, January 30, 1998.

13. *Information Technology (IT) Capital Planning and Investment Guide*, Version 1.1, FEMA, August 12, 1997.

14. *FEMA Missions and Functions Manual 1010.1*, July 27, 1995.

15. *Draft NEMIS Concept of Operations (Operations and Maintenance)*, FEMA Information Technology Services Directorate, Operations Division, April 25, 1997.

16. *NEMIS Human Services System, Individual and Family Grant and Disaster Housing Programs, Business Rules*, FEMA, February 27, 1998.

17. *NEMIS Data Dictionary Naming Standards and NEMIS Conceptual Data Model*, FEMA Information Technology Services Directorate, September 24, 1996.

18. *NEMIS Functional Description*, FEMA Information Technology Services Directorate, February 9, 1996.

19. *NEMIS Project Plan*, FEMA Information Technology Services Directorate, July 10, 1997.

20. *NEMIS Data Model*, FEMA Information Technology Services Directorate, January 31, 1996

21. *NEMIS System-Subsystem Specification*, FEMA Information Technology Services Directorate, September 6, 1996.

22. *NEMIS System Alternative Analysis*, FEMA Information Technology Services Directorate, November 25, 1996.

23. *Information Management Directions: The Integration Challenge*, NIST Special Publication 500-167, September 1989.

24. *Life Cycle Management for Automated Information Systems*, Patent and Trademark Office, December 1997.

25. *Strategic Information Technology Plan for Fiscal Years 1997 – 2002, Executive Overview*, Patent and Trademark Office, April 1997.

26. *Technical Reference Model*, Version 3.0, Patent and Trademark Office, October 28, 1997.

27. *C4ISR Architecture Framework*, Version 2.0, C4ISR Architecture Working Group, Department of Defense, December 18, 1997.

28. *Cultivating Successful Software Development*, Scott E. Donaldson and Stanley G. Siegel, Prentice Hall PTR, 1997.

29. *Capability Maturity Model for Software*, Version 1.1, Software Engineering Institute, February 1993.

30. *Department of Defense (DOD) Technical Architecture Framework for Information Management (TAFIM).*

Working Papers

Legislative Authority for Civil Emergency Management, FEMA, undated.

Emergency Mobilization Preparedness, The White House, July 22, 1982.

History of FEMA Responsibility for Response to National Security Emergencies, FEMA, undated.

Concept – A FEMA Enterprise Architecture Called NEMIS, ITS Directorate, undated.

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Appendix C FEMA and Comprehensive Emergency Management (CEM) References in Public Law, Regulations, and Directives

This appendix identifies the major references to FEMA and comprehensive emergency management in public law, regulations, and directives. In general, IT systems must be developed and implemented to support the information flow requirements implicit in these references. This appendix is organized as follows:

- Statutes referencing FEMA
- Statutory roles for FEMA pursuant to an Executive Order or Memorandum of Understanding, where the statute does not mention FEMA
- Executive Orders referencing FEMA
- Other statutes and orders impacting Comprehensive Emergency Management
- Regulations and agreements.

Statutes Referencing FEMA

1. *Reorganization Plan No. 3 of 1978*, 3 CFR 1978 Com. p. 329, 5 U.S.C App.1, note (Authority for FEMA).

2. Section 101, *Defense Production Act of 1950*, Public Law 81-774, as amended, 50 U.S.C App. §2061, et seq. (See E.O. 12742, E.O. 12919, ad 15 CFR Part 700 and 44 CFR Parts 320-336).

   This provision authorizes the President to establish performance priorities and to allocate materials and facilities to promote the national defense.

3. *Department of Defense Authorization Act for 1986*, §1412 (Public Law 99-145; 99 Stat. 747), as amended by Public Law 101-510, both codified as 50 U.S.C. §1521. (Authority for CSEPP. See MOU between FEMA and DA signed October 8, 1997).

4. Section 5, *Earthquake Hazards Reduction Act of 1977*, Public Law 95-124, as amended most recently by Public Law 105-47 (October 1, 1997), 42 U.S.C. §7701 et seq. (See E.O. 12699 and E.O. 12941 and 44 CFR Parts 361 and 362).

   The *Earthquake Hazards Reduction Act of 1977* provides for the establishment of the National Earthquake Hazards Reduction Program (NEHRP) to reduce the risk to life and property from future earthquakes in the United States. FEMA is designated as the agency with primary responsibilities to plan and coordinate the NEHRP, which has five major elements: Hazards Delineation and Assessment; Earthquake Prediction Research; Seismic Design and Engineering Research; Preparedness Planning and Hazards Awareness; and, Fundamental Seismological Studies. Planning for the Federal response to a catastrophic earthquake is a major aspect of Preparedness Planning and Hazard Awareness under the NEHRP.

5. *Emergency Planning and Community Right to Know Act of 1986*, as amended, 42 U.S.C. §11001 et seq.

   Authority for hazard materials planning and disclosure and contains statutory exemption for FEMA programs, e.g., REP and CSEPP (See 40 CFR Part 355).

6. *Federal Fire Prevention and Control Act of 1974*, as further amended by the *Hotel and Motel Fire Safety Act of 1990* (Public Law 101-391) and the *Arson Prevention Act of 1994* (Public Law 103-254) and *Firefighters' Safety Study Act* (Public Law 101-446) all codified at 15 U.S.C. §2201 et seq., all re-authorized by the *United States Fire Administration Authorization Act for Fiscal Years 1998 and 1999* (Public Law 105-108). See also 44 CFR Parts 150-152.

7. *Great Lakes Planning Assistance Act of 1988*, Title II of Public Law 100-707, 33 U.S.C. §426 note (See 44 CFR Part 207).

8. *Hazardous Materials Transportation Authorization Act of 1995*, Public Law 103-311, codified at 49 U.S.C. §5101 et seq.

   Hazardous materials response planning and training including reference to FEMA in §5115).

9. Section 301, *Multi-hazard Research, Planning, and Mitigation Act*, Public Law 96-472, 45 U.S.C §5195 note (no regulations).

   Authorizes FEMA Director to conduct programs of multi-hazard research, planning, and mitigation of natural and manmade hazards, particularly with respect to research and training.

10. *National Dam Safety Program Act*, 33 U.S.C. §467 et seq. (no regulations).

11. *National Security Act of 1947*, as amended, 50 U.S.C. §§ 404, 405 and 411 (See E.O. 12656). See 44 CFR Parts 320-337, 47 CFR Part 201 et seq.

    This Act establishes the Department of Defense, Central Intelligence Agency, National Security Council, and authorizes the President to conduct certain operations and activities to promote national security.

12. *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, Public Law 93-288, as amended, 42 U.S.C. §5121 et seq. (See E.O. 12673 and 44 CFR Parts 206 and 300).

    The *Robert T. Stafford Disaster Relief and Emergency Assistance Act* provides an orderly and continuing means of assistance by the Federal government to State and local governments in carrying out their responsibilities before, during, and after disasters and emergencies to alleviate the suffering and damage which result from

disasters. The President, in response to a State Governor's request, may declare an emergency or major disaster, in order to provide Federal assistance under the Act.

13. Section 301-322, *Stewart B. McKinney Homeless Assistance Act*, Public Law 100-71, as amended, 42 U.S.C. §11311 et seq.

    Establishes the Federal Emergency Management Food and Shelter Program.

14. *National Flood Insurance Act of 1968*, Public Law 90-48, as further amended by *Flood Disaster Protection Act of 1973*, Public Law 93-234, and *National Flood Insurance Reform Act of 1994*, all codified at 42 U.S.C §4001 et seq. (See 44 CFR Parts 59-79).

15. *Codification in the United States Code of Defense Against Weapons of Mass Destruction Act*, Title XIV of Public Law 104-201.

Statutory Roles for FEMA Pursuant to Executive Order or Memorandum of Understanding, Where the Statute Does Not Mention FEMA

1. *Atomic Energy Act of 1954*, as amended, 42 U.S.C. §2011 et seq. (Authority for Radiological Preparedness Program, See E.O. 12241 and 10 CFR Part 50 and 44 CFR Parts 350-354).

2. Section 309(f), *Communications Act of 1934*, as amended, 47 U.S.C §§151 et seq.

   Establishes authority for interoperable emergency communications systems – Federal, State, local, and private. See E.O. 12046 and E.O. 12472 and 47 CFR Part 64 and 201).

3. Section 104(I), *Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)*, Public Law 96-510, as further amended by *Superfund Amendments and Reauthorization Act of 1986 (SARA)*, 42 U.S.C. §9615 et seq. (See E.O. 12580 and NCP at 40 CFR Part 300).

   Provides authority for Federal and State governments to respond directly to hazardous substances instances.

4. *National Emergencies Act*, as amended, 50 U.S.C. §1601 et seq.

   Statutory process for declaration of national emergencies.

Executive Orders Referencing FEMA

1. Executive Order 11988 of May 24, 1977, as amended, *Floodplain Management,* 3 CFR, 1977 Comp., p. 117, 42 U.S.C. §4321 note p. 191. (See 44 CFR Part 9).

   This Order was designed to establish that Federal agencies give floodplains special consideration in the agencies' operations and activities. Under the order, FEMA and the Corps of Engineers are required to provide leadership and take actions to:

   - Avoid development in the base floodplain unless it is the only practicable alternative
   - Reduce the hazard and risk associated with floods
   - Minimize impact of floods on human safety, health and welfare
   - Restore and preserve the natural and beneficial values of the base floodplain.

   Note: See *National Flood Insurance Act of 1968*.

2. Executive Order 10421 of December 31, 1952, *Physical Security of Defense Facilities.*

3. Executive Order 12046 of March 27, 1978, as amended, *Relating to the Transfer of Telecommunications Functions*, 3 CFR, 1978 Comp., p. 158. (See 47 CFR Part 201).

4. Executive Order 12127 of March 31, 1979, *Federal Emergency Management Agency*, 3 CFR, 1979 Comp., p. 376. (Implements *Reorganization Plan No. 3 of 1978*).

5. Executive Order 12148 of July 20, 1979, as amended, *Federal Emergency Management*, 3 CFR, 1979 Comp., p. 412 (Implements *Reorganization Plan No. 3 of 1978*).

   Executive Order 12148 transferred functions and responsibilities associated with Federal emergency management to the Director, FEMA. Assigns the Director, FEMA the responsibility to establish Federal policies for and to coordinate all civil defense and civil emergency planning, management, mitigation, and assistance functions of Executive Agencies. This E.O. also implements *Reorganization Plan No. 3 of 1978.*

   "For purposes of this Order, 'civil emergency' means any accidental, natural, man-caused, or wartime emergency or threat thereof, which causes or may substantial injury or harm to the population or substantial damage to or loss of property."

6. Executive Order 12241 of September 29, 1980, *National Contingency Plan [Radiological Emergencies]*, 3 CFR, 1980 Comp., p. 282. (Note: source of Federal Radiological Emergency Response Plan (FRERP)).

7. Executive Order 12472 of April 3, 1984, *Assignment of National Security and Emergency Preparedness Telecommunications Functions*, 3 CFR, 1984 Comp., p. 193. (See 47 CFR Part 201).

   Executive Order 12472 establishes the National Communications System (NCS). The NCS consists of the telecommunications assets of the entities represented on the NCS Committee of Principals and an administrative structure consisting of the Executive Agent, the NCS Committee of Principals and an administrative structure consisting of the Executive Agent, the NCS Committee of Principals, and the Manager. The NCS Committee of Principals consists of representatives from those Federal departments, agencies, or entities, designated by the President, which lease or own telecommunications facilities or services or significance to national security or emergency preparedness.

8. Executive Order 12580 of January 23, 1987, as amended, *Superfund Implementation*, 3 CFR, 1987 Comp., p. 193 (Note: Amended by E.O. 12777 of October 18, 1991, and further amended by E.O. 13016 of August 28, 1996). (See 40 CFR Part 300).

9. Executive Order 12656 of November 18, 1988, *Assignment of Emergency Preparedness Responsibilities*, 3 CFR, 1988 Comp., p. 585, amended by E.O. 13074, February 9, 1998 (63 Federal Register 7277).

   Assigns emergency preparedness responsibilities to Federal departments and agencies.

10. Executive Order 12657 of November 18, 1988, *Federal Emergency Management Agency Assistance in Emergency Preparedness Planning at Commercial Nuclear Power Plants*, 3 CFR, 1988 Comp., p. 611. (See 44 CFR Part 352).

    Assigns FEMA and other Federal agencies certain emergency planning responsibilities related to commercial nuclear power plants.

11. Executive Order 12673 of March 23, 1989, *Delegation of Disaster Relief and Emergency Assistance Functions*, 3 CFR, 1989 Comp., p. 308 (See 44 CFR Part 206).

12. Executive Order 12699 of January 5, 1990, *Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction*, 3 CFR, 1990 Comp., p. 269.

13. Executive Order 12742 of January 8, 1991, *National Security Industrial Responsiveness*, 3 CFR, 1991Comp., p.309.

14. Executive Order 12919 of June 3, 1994, *National Defense Industrial Resources Preparedness*, 3 CFR, 1994 Comp., p. 901 (See 15 CFR Part 700, 44 CFR Parts 321-336).

This document delegates authorities and addresses national defense resource policies and programs under the *Defense Production Act of 1950*, as amended.

15. Executive Order 12941 of December 1, 1994, *Seismic Safety of Existing Federally Owned or Leased Buildings*, 3 CFR, 1994 Comp., p. 955.

16. Executive Order 12958 of April 17, 1995, *Classified National Security Information.*

17. Executive Order 13010 of July 15, 1996, *Critical Infrastructure Protection.*

18. Executive Order 13704 of February 9, 1998, *Amending Executive Order 12656.*

Other Statutes and Orders Impacting Comprehensive Emergency Management

1. Section 5(h), *Food Stamp Act of 1977*, Public Law 93-113, as amended (7 U.S.C. 2014(h)).

   Authorizes the Department of Agriculture to make food stamps available to low income households in any disaster situation in which normal channels of retail food distribution have been restored and the existing Food Stamp Program cannot handle applications from affected households. Food stamp assistance must be requested by a State.

2. *Urban Property Protection and Reinsurance Act of 1968*, Public Law 90-448, as amended (12 U.S.C. 1749b et seq.).

   This Act provides crime insurance at affordable rates in urban areas to small businesses and individuals.

3. Section 7(b), *Small Business Act*, Public Law 85-536, as amended (15 U.S.C. 636(b)).

   When physical disasters are declared by the President or the Administrator of SBA, this Act authorizes SBA to make long term, low interest loans to victims to repair or replace uninsured disaster damaged property. SBA's disaster loans are the primary form of Federal recovery assistance for non-farm, private sector disaster losses. The disaster loan program is the only form of SBA assistance not limited to small businesses. Disaster loans are direct loans available to homeowners, renters, businesses of all sizes, and nonprofit organizations. The interest rate on most loans cannot exceed 4 percent and the term can be as long as 30 years. The maximum amount to individuals is $200,000 for real estate, and $40,000 for personal property. Loans can be increased by 20 percent for mitigation purposes and some existing liens can be refinanced. For businesses, the maximum loan is $1,500,000, which can be waived for major sources of employment.

4. Section7, *Cooperative Forestry Assistance Act of 1978*, Public Law 95-313, as amended (16 U.S.C. 2106).

   This Act authorizes the Secretary of Agriculture to assist in the prevention and control of rural fires through coordination among Federal, State, and local agencies; and to provide prompt and adequate assistance whenever a rural fire emergency overwhelms, or threatens to overwhelm, the fire-fighting capability of the affected State or rural area.

5. Section 125, Title 23 U.S.C., *Highways*, Public Law 85-767, as amended (23 U.S.C. 125).

   This provision authorizes the Secretary of Transportation to provide funding assistance for the repair of federal-aid highways or roads on Federal lands that have been seriously damaged by natural disasters or catastrophic failures from an external cause. Congress had created a special emergency relief fund within the Federal-aid highway account for these repairs. Federal funding assistance is intended to supplement the commitment of resources by state, counties and cities or other Federal agencies to help pay for usually heavy expenses resulting from extraordinary conditions.

6. *Flood and Coastal Storms Emergencies Act*, Public Law 84-99, as amended (33 U.S.C. 701n).

   Authorizes an emergency fund to be used "…in preparation for emergency response to any natural disaster, in flood fighting and secure operations, or in the repair or restoration of any flood control work threatened or destroyed by flood…" and "emergency drinking water and for emergency dredging for restoration of authorized projects for Federal navigable channels and waterways made necessary by flood, drought, earthquake, or other natural disasters."

7. *Act of January 5, 1905*, as amended (36 U.S.C. 1 et seq.).

   The American National Red Cross Congressional Charter assigning the authority and responsibility for the American Red Cross to undertake activities for the relief of individuals suffering from a disaster.

8. Section 216, *Public Health Service Act*, Public Law 78-410, as amended (42 U.S.C. 217).

   This provision authorizes the President, in time of war or upon Presidential proclamation of an emergency, to utilize the Public Health Service to the extent and in the manner that in his judgement will promote the public interest.

9. Section 311, *Clean Water Act*, as amended by Section 4201 of the *Oil Pollution Act of 1990*, Public Law 101-380 (33 U.S.C. 2701 Note).

This statute provides authority for Federal planning, preparedness and response activities for addressing oil, and to a lesser extent, hazardous substance release or discharges.

10. Section 311, *Public Health Service Act*, Public Law 78-410, as amended (42 U.S.C. 243).

    This provision authorizes the Secretary of Health and Human Services to develop (and take such action as may be necessary to implement) a plan under which personnel, equipment, medical services, and other resources of the Public Health Service and other agencies under the jurisdiction of the Secretary may be effectively used to control epidemics of any disease or condition and to meet other health emergencies or problems involving or resulting from disasters or any such disease.

11. Section 319, *Public Health Service Act*, Public Law 78-410, as amended (42 U.S.C. 247D).

    This provision authorizes the Secretary of Health and Human Services to take appropriate action to respond to a *public health emergency* resulting from disease, disorder, or other cause. The Secretary must consult with the Director of the National Institute of Health, Administrator of the Alcohol, Drug Abuse, and Mental Health Administration, Commissioner of the Food and Drug Administration, or the Director of the Center for Disease Control before determining that an emergency exists, and he must act through the official in responding to the emergency.

12. Section 310, *Older Americans Act of 1965*, Public Law 89-73, as amended (42 U.S.C. 3030).

    This provision authorizes the Commissioner of the Administration on Aging to reimburse States for social services provided to older Americans following a Presidentially-declared disaster.

13. Section 10724 (Emergency Rates) and Subchapter II (Car Service), *Interstate Commerce Act*, Public Law 95-473, as amended (949 U.S.C. 10724, 11121-11128).

    These authorities allow the Interstate Commerce Commission (ICC) to authorize a common carrier to give reduced rates for service and transportation in an emergency. Further, these authorities permit the ICC to suspend any car service rule or practice, take action during emergencies to promote car service in the interest of the public and commerce; to require joint or common use of facilities when that action will best meet the emergency; to direct preferences or priorities in transportation, embargoes, or movement of traffic under permits; and to reroute traffic.

14. Executive Order 12777 of October 18,1991, *Implementation of Section 311 of the Federal Water Pollution Act of October 18, 1972, as amended, and the Oil Pollution Act of 1990,* (3 CFR 1991 Comp., p. 351).

    This document was published to re-delegate authority granted to the President under the *Oil Pollution Act of 1990*. The *Oil Pollution Act* in particular, assigns to Interior (re-delegated to the Minerals Management Service) and other Federal agencies (US Coast Guard and the Environmental Protection Agency) emergency planning responsibilities for oil spills and hazardous substances.

Regulations and Agreements

1. 7 CFR, Part 251, *The Emergency Food Assistance Program*.

    These regulations, which implement sections 409 and 410(b) of the *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, allow any person/household temporarily displaced by a disaster to obtain USDA foods in congregate feeding provided by volunteer organizations such as the American Red Cross and the Salvation Army; no formal approval is required from USDA. Additionally, low income families can receive household distributions of food in situations where Food Stamp Program is not available (e.g., commercial channels of trade are disrupted); formal USDA approval is required.

    The *Stafford Act* provides: "The Secretary of Agriculture shall utilize funds appropriated under Section 32 of the Act of August 1935 (7 U.S.C. 612 c) to purchase food commodities necessary to provide adequate supplies for use in any area of the United States in the event of a major disaster or emergency in such area."

2. 7 CFR, Part 280, *Emergency Food Assistance for Victims of Disaster*.

    This provides for issuance of food stamps to victims of disaster when their households have lost food in the disaster or are otherwise in temporary need and commercial channels of distribution have been disrupted and later restored.

3. 28 CFR, Part 65, *Emergency Federal Law Enforcement Assistance*.

    These Department of Justice regulations implement the Emergency Federal Law Enforcement Assistance functions vested in the Attorney General by the *Justice Assistance Act of 1984* (Public Law 98-473). Those functions were established to assist State and/or local units of government in responding to a law enforcement emergency. The Act defines the term *law enforcement emergency* as an uncommon situation which requires law enforcement, which threatens to become of serious or epidemic proportions, and with respect to which State and local resources are inadequate to protect the lives and property of citizens, or to enforce the criminal law.

Emergencies which are not of an ongoing or chronic nature, such as the Mount Saint Helens volcanic eruption, are eligible for Federal law enforcement assistance. Such assistance is defined as funds, equipment, training, intelligence information, and personnel. Requests for assistance must be submitted in writing to the Attorney General by the chief executive officer of a State. The Plan does not cover the provision of law enforcement assistance. Such assistance will be provided in accordance with the regulations referred to in this paragraph [28 CFR Part 65, implementing the *Justice Assistance Act of 1984*] or pursuant to any other applicable authority of the Department of Justice.

4. 40 CFR, Part 300, *National Oil and Hazardous Substances Pollution Contingency Plan (NCP).*

   The purpose of the NCP is to effectuate the powers and responsibilities for responding to non-radiological oil and hazardous substance discharges, releases, or substantial threats of releases as specified in the *Comprehensive Environmental Response, Compensation and Liability Act*, as amended, (CERCLA) and the authorities established by section 311 of the *Clean Water Act*, as amended. Section 105 of CERCLA, 42 U.S.C. 9605, and section 311c(2) of the *Clean Water Act*, as amended, 33 U.S.C. 1321c(2).

5. 44 CFR 1.1, *Emergency Management and Assistance,* October 1, 1997.

   Provides the overall set of rules for FEMA.

6. DOD Directive 3025.1, *Military Support to Civil Authorities (MSCA)*, 1992.

   This Directive outlines Department of Defense (DOD) policy on assistance to the civilian sector during disasters and other emergencies. Use of DOD military resources in civil emergency relief operations will be limited to those resources not immediately required for the execution of the primary defense mission. Normally, DOD military resources will be committed as a supplement to non-DOD resources, which are required to cope with the humanitarian and property protection requirement caused by the emergency. In any emergency, commanders are authorized to employ DOD resources to save lives, prevent human suffering, or mitigate great property loss.

   Upon declaration of a major disaster under the provisions of Public Law 93-288, as amended, the Secretary of the Army is the DOD Executive Agent, and the Director of Military Support is the action agent for civil emergency relief operations. Military personnel will be under command of and directly responsible to their military superiors and will not be used to enforce or execute civil law in violation of 18 U.S.C. 1385 except as otherwise authorized by law. Military resources shall not be procured, stockpiled, or developed solely to provide assistance to civil authorities during emergencies.

7. *Federal Communications Commission Report and Order of August 4, 1981*.

   This Order modified parts 2, 90, and 99 of the Commission Rules and Regulations to establish a disaster radio response capability for local government and State radio services.

8. *Federal Radiological Emergency Response Plan*.

   This document is to be used by Federal agencies in peacetime radiological emergencies. It primarily concerns the off-site Federal response in support of State and local governments with jurisdiction for the emergency. The *Federal Radiological Emergency Response Plan (FRERP)* provides the Federal government's concept of operations based on specific authorities for responding to radiological emergencies, outlines Federal policies and planning assumptions that underlie this concept of operations, and specifies authorities and responsibilities of each Federal agency that may have a significant role in such emergencies.

9. *National Plan for Telecommunications Support in Non-Wartime Emergencies*, January 1992.

   This plan provides guidance in planning for and providing telecommunications support for Federal agencies involved in emergencies, major disasters, and other exigencies, excluding war.

10. Federal Preparedness Circular 8, *Public Affairs in Emergencies*.

    This circular establishes the Interagency Committee on Public Affairs in Emergencies (ICPAE) to coordination public information planning and operations for management of emergency information. The Circular was reviewed in draft, by the ICPAE and will receive formal department and agency review.

11. American Red Cross Disaster Services Program, *Foundations of the Disaster Services Program*, ARC 3003, October 1994.

    This document provides an overview of the American Red Cross Disaster Services Program including policy and mission statements.

12. American Red Cross Disaster Services Regulations and Procedures, *Mass Care – Preparedness and Operations*, ARC 3031, April 1987.

    This document details the American Red Cross mass care preparedness and operating regulations and procedures.

13. American Red Cross Disaster Services Regulations and Procedures, *Disaster Welfare Inquiry*, ARC 3035, September 1990.

This document details the American Red Cross disaster welfare inquiry preparedness and operating regulations and procedures.

14. American Red Cross Disaster Services Regulations and Procedures, *Disaster Health Services – Preparedness and Operations,* ARC 3050, April 1988.

    This document details the American Red Cross disaster health services preparedness and operating regulations and procedures.

15. American Red Cross Disaster Services Regulations and Procedures, *Disaster Mental Health Services,* ARC 3050M, November 1991.

    This document details the American Red Cross disaster mental health services preparedness and operating regulations and procedures.

16. *American National Red Cross National Board of Governors Disaster Services Policy Statements,* February 1994.

    This document outlines the basic policies of the American Red Cross disaster services program, and the disaster relief services to be provided by units of the American Red Cross on a uniform and nationwide basis.

17. *Statement of Understanding Between the Federal Emergency Management Agency and the American National Red Cross,* January 22, 1982.

    The statement of understanding between FEMA and the American National Red Cross describes major responsibilities in disaster preparedness planning and operations in the event of a war-caused national emergency or a peacetime disaster. It also outlines areas of mutual support and cooperation and provides a frame of reference for similar cooperative agreements between State and local governments and the operations headquarters and chapters of the ARC.

Appendix D Catalog of FEMA Program-Centric Systems

This appendix provides a listing of current and near-term program-centric IT systems at FEMA. For completeness purposes, some modules or sub-systems of enterprise-wide systems have been included in the listing. This is particularly the case for modules that have not yet been fully integrated. As the *FEMA IT Architecture* is implemented, it is envisioned that a number of the program-centric systems listed below may be consolidated, retired, and/or re-engineered. In the target *IT Architecture*, the ITS Directorate will support the program office (or owner of the system) in the development of the project by providing technical and engineering services. The program office will manage the programmatic aspects, including funding and contracts if the program office chooses not to use existing IT contracts.

In general, program-centric systems will be able to use common, standardized and accepted architectural components. Program-centric systems are effectively the *complement* of enterprise-wide system. In the target *FEMA IT Architecture*, program-centric systems are characterized by one or more of the following features:

- Narrow scope
- Single user or few users with a common purpose
- System does not require extensive business process or administrative process interaction with other systems and/or processes. For example, program-centric systems would be largely standalone and require no complex interfaces with enterprise-wide systems
- Data sharing with other systems is minimal, typically through a straightforward data exchange rather than as an integrated part of the business processes
- System is able to use common architectural components and is consistent with an enterprise-wide data dictionary
- Consistent with *IT Architecture* and accepted IT standards without duplication of effort.

Acronym: AACS
Title: Automated Access Control System
Owner: OS-SY-FS
Description: Provides an automated system for tracking and controlling access to FEMA Headquarters facilities.

Acronym: AAMS
Title: Automated Acquisition Management System
Owner: FM-SR
Description: AAMS is an automated procurement system which includes a document generation module (ProDoc): a procurement data collection, tracking and reporting module (Pro Trac); procurement regulation search module (RegSearch); and bidders

mailing list module (ProBid). AAMS supports HQ, satellite, and regional procurement personnel in the acquisition of goods and services.

Acronym: AdmSys
Title: Admissions System
Owner: FA-OP-TS
Description: Contains the records of all resident and field students attending National Fire Academy (NFA) and the records on Emergency Management Institute (EMI) resident courses and housing assignment and utilization. This system also supports the EMI training activities conducted at Mt. Weather as well as direct deliveries in other parts of the country. It is in the process of being updated and will be able to handle the lodging for Mt. Weather. This system is also critical in the management of related student services. Several modules comprise this system and perform and manage the following activities:

- Selects students geographically and assigns them to valid course offerings
- Housing module to assign student names for housing at the National Emergency Training Campus (NETC)
- Module to manage special groups
- Module that automates the stipend program from the receipt of payment vouchers to their electronic transfer to the Department of Treasury for reimbursement to the student
- Interface with the Procurement system that automates room assignments for contract instructors and the reporting of their 1099 information for the IRS
- Module that manages student ground transportation
- Module that administers student services including food service, course certificates, transcripts and recreational activities.

Acronym: AFMS
Title: Automated Forms Management System
Owner: OS-PS-RM
Description: An automated system for developing, filling out, and routing forms electronically throughout FEMA. This system has been purchased from a software vendor to automate the use of forms within FEMA. The electronic forms are stored on a Windows NT server. These forms can be accessed and filled out on the client PC. If desired they can be e-mailed. Future initiatives are to encrypt sensitive data such as electronic signature and social security number. Also there is the need to sequentially route or use multiple addresses at Headquarters or to the regions. The software is Y2K compliant.

Acronym: APERMAN
Title: Automated Personnel Management System
Owner: HR
Description: A local area network (LAN) that is connected to the FEMA wide area network (WAN) and provides controlled access to NFC's personnel/payroll system for OHRM staff and Agency timekeepers. It also includes a variety of data bases in Access

and Excel to record performance data, maintain and transfer nation Emergency Response Team (ERT) rosters, download and transfer human resources management information reports, several document tracking systems, etc. The system also hosts proprietary COTS software including a personnel reference library (PERSONNET), COHO, and CHINOOK.

Acronym: APSS
Title: Automated Personnel Security System
Owner: OS-SY-PI
Description: Provides for an automated system of control of all personnel security records.

Acronym: ARTS
Title: Audit Report Tracking System
Owner: IG-AU
Description: A standalone system that maintains, tracks, and reports on all audit reports issued by the Office of Inspector General's Audit Division and audit reports issued by other Federal and non-Federal auditors on FEMA activities that are processed by the Audit Division.

Acronym: BIIDB
Title: Badge Imaging Information Data Base
Owner: OS-SY-FS
Description: PC-based, standalone system in Headquarters, Regions, and field offices with digital cameras and printers used to create FEMA ID badges.

Acronym: BTS
Title: Budget Tracking System
Owner: Region VII
Description: A Region VII initiative to increase the availability of financial information to regional management staff.

Acronym: BudSys(PT)
Title: PT Budget System
Owner: PT
Description: A series of interlinked spreadsheets used by the PT&E Directorate to track internal budget numbers.

Acronym: CAPSS
Title: Corrective Action Program Support System
Owner: PT-EX
Description: An automated system integrating several COTS software products (Microsoft Windows operating system, Microsoft Access data base, SmarText hypertext, and WordPerfect for Windows word processing). The main feature of the system is a data base of issues and corrective actions generated by evaluations of disaster response and recovery efforts and exercises. CAPSS is being developed to supply a corrective

action process of validation and improvement for planning and operational readiness capabilities of the Federal government.

Acronym: CATS
Title: Consequences Assessment Tool Set
Owner: MT
Description: Modeling package to assess risk exposure and plan immediate response.

Acronym: CIS
Title: Community Information System
Owner: MT and IA
Description: Provides community-specific information regarding activities and operations related to floodplain management, mapping, and insurance for NFIP communities. The NFIP-CIS supersedes the FIAMIS and the NFIPS.

Acronym: CLS
Title: Central Locator System
Owner: NS
Description: Maintains a current list of key government officials.

Acronym: DCAS
Title: Document Control and Accountability System
Owner: OS-SY-PI
Description: A data base management system used to store and retrieve information on all FEMA classified documents processed through the Document Control Center.

Acronym: DON
Title: Donations
Owner: FA-OP
Description: A computerized data base that maintains and reports on all donations accepted in accordance with the *Federal Fire Prevention and Control Act*.

Acronym: ECSLRM
Title: Electronic Catalog System for Library Records and Materials
Owner: OS-PS-RM
Description: A system to catalog and manage library bibliographic records, to provide an on-line catalog, and to provide access to FEMA Headquarters library materials.

Acronym: EMERS
Title: Emergency Management Exercise Reporting System
Owner: PT-EX
Description: Provides FEMA with the data needed to assess the effectiveness of emergency management capabilities at the State and local levels.

Acronym: ESDP
Title: Engineering Studies Data Package
Owner: MT-HZ-ID
Description: Fee charge system, which provides access to engineering studies, models, and applications for mitigation purposes.

Acronym: FANMAP
Title: FEMA Automated Network Management Program
Owner: IT-MA-CM
Description: Program that creates a file of frequencies to load into identified HF radios. Being re-engineered.

Acronym: FNAPS
Title: FEMA National Paging System
Owner: IT-OP
Description: A 24-hour commercial nationwide paging system available to selected personnel.

Acronym: FNARS
Title: FEMA National Radio System
Owner: IT-OM-TL
Description: A high frequency (HF) single sideband radio system designed to back up landline-based systems and ensure continued connectivity between the Federal, State, and territorial governments. The mode of operations is secure and non-secure voice and data, and each of the FNARS stations in the 10 Federal Regions and each State Emergency Operations Center (EOC) is equipped with telephone patch. Each station is equipped with a telephone to operate in the Automatic Link Establishment (ALE) mode in accordance with Federal Standard 1045, as well as the conventional mode. The FNARS is the primary backup communications system for the Federal Response Plan.

Acronym: GCCS
Title: Global Command and Control System
Owner: RR-OP-OC, NECC
Description: A DOD-sponsored information processing and exchange system authorized to process data up to Top Secret.

Acronym: HAZUS
Title: Loss Estimation (HAZUS)
Owner: MT-HZ-RA
Description: Provides capability to estimate losses and damages from natural hazards. Available in two versions: the original MapInfo version and an ArcView version. HAZUS is being expanded into a multi-hazard methodology with new models for estimating potential losses from wind (hurricanes, thunderstorms, tornadoes, extra tropical cyclones and hail) and flood (riverine and coastal) hazards.

Acronym: HMGPDB
Title: Hazard Mitigation Grant Program (HMGP) National Data Base
Owner: MT-PI
Description: Used to capture data on projects submitted to FEMA by States for funding through the HMGP. Contains information on key aspects of program implementation, such as project type, cost, cost-share, environmental review, and benefit-cost analysis. Has a significant reporting function to allow for effective program monitoring and evaluation at both regional and headquarters levels.

Acronym: ICIMPP
Title: Integrated Civilian Industrial Mobilization Planning Process
Owner: PT-RP
Description: Integrated set of economic models that trace capital labor and material shortfalls for an emergency. Will be retired in Mar 99.

Acronym: IMIS
Title: Investigations Management Information System
Owner: IG-ID
Description: A system that maintains, tracks, and provides statistical information on investigations conducted by the office of Inspector General, Investigations Division.

Acronym: IMIS-CtlSys
Title: Investigations Management Information System – Control System
Owner: IG-IV
Description: Control System is a subsystem of the IMIS that maintains, tracks, and reports allegations received from the OIG Hotline.

Acronym: ISDBS
Title: Independent Study Data Base System
Owner: PT-TR
Description: Used to capture and maintain the names, addresses, and course information for all students that have taken an independent study course.

Acronym: ITS
Title: Action Items Tracking System
Owner: FA-OP-TS
Description: A computerized system that maintains, tracks, and reports on all actions assigned for the U.S. Fire Administration.

Acronym: JobTr
Title: Job Track
Owner: FA-OP-TS
Description: A computerized system that documents, maintains, tracks, and reports on all work orders related to the maintenance of the NETC facility. This system tracks and schedules preventive maintenance tasks for all installed electrical/mechanical equipment and building and grounds maintenance. It is a DOS-based system.

Acronym: JSMS
Title: Joint Spectrum Management System
Owner: IT-OM-TL
Description: A computerized system designed for spectrum management by NTIA. Provides unique functions for the Federal government to assign, manage, and apply for frequencies. Replaces FFMS.

Acronym: LARS
Title: Logo Authorization Reporting System
Owner: FA-OP
Description: A computerized system that maintains and reports on activities authorized to sell, use or distribute the FEMA Seal and/or the Fire Programs Logo.

Acronym: LIBSYS
Title: FEMA Library System
Owner: MT
Description: Electronic data base used by Technical Evaluation Contractors to achieve flood insurance back-up data including, but not limited to, parcels (boxes) that contain hardcopy printouts of hydraulic and hydrologic modeling, mapping, reports, and aerial photographs.

Acronym: LODR
Title: Letters of Determination Review System
Owner: MT-HZ-ID
Description: Provides the ability to track Letters of Map Determination

Acronym: LOMA
Title: Letters of Map Amendment System
Owner: Region VII
Description: A data base application that is used to keep track of and respond to requests for floodplain determinations to individuals.

Acronym: MERS
Title: Mobile Emergency Response Support Detachments
Owner: RR-MO
Description: Five self-contained Detachments designed to provide telecommunications, operations, logistical, and life support for Emergency responders in support of FEMA's All-Hazard mission.

Acronym: MERS-ALPHA
Title: MERS ALPHA System
Owner: RR-MO
Description: A subsystem of the secure LAN that will be replaced with the FEMA secure LAN.

Acronym: MERS-FSL
Title: FEMA Secure LAN
Owner: RR-MO
Description: This system will replace both MERS ALPHA and SLAN.

Acronym: MERS-MRV
Title: Mobile Response Vehicle
Owner: RR-MO
Description: Multiple radio *Ku band* satellite system for long range telecommunications.

Acronym: MMS
Title: Mail Management System (under development)
Owner: OS-PS-RM
Description: An automated system that links mail operation units in FEMA, Regional Offices, MWEAC, NTC, Disaster Field Sites, and Disaster Field Offices to FEMA Headquarters Mail Management Operations. The system formulates and identifies postage costs and provides monthly costs status reports.

Acronym: MNUSS
Title: Mapping Needs Update Support System
Owner:
Description: A data base to house the National Inventory of Mapping Needs and to assist in analyzing and prioritizing the mapping needs.

Acronym: MSCIMS
Title: Map Service Center Inventory Management System
Owner: MT and IA
Description: Track and control the distribution of Flood Insurance Rate Maps that are required by 18,000 participating National Flood Insurance Program communities and by all lending institutions for administering the statutory requirements of the National Flood Insurance Program. Used by insurance agents nationwide for the sale and servicing of federal flood insurance policies.

Acronym: NAWAS
Title: National Warning System
Owner: IT-EN
Description: This system is presently a leased land-line communication system. The United States developed the NAWAS for civil defense purposes under the authority of the *Federal Civil Defense Act of 1950*. The government designed it primarily for warning of nuclear attack to Federal, State, and local governments, and to the military and civilian population.

Acronym: NDER
Title: National Defense Executive Reserve System
Owner: PT-RP

Description: Central data base on individual status of National Defense Executive Reservists government-wide. The system generates Congressional and management reports.

Acronym: NETCCS
Title: NETC Copier System
Owner: FA-OP-TS
Description: A computerized data base that contains and reports rental and maintenance information related to campus copiers.

Acronym: NETCLAN
Title: NETC Local Area Network
Owner: FA-OP-TS
Description: The NETC Local Area Network (LAN) is a system of workstations and file servers serving the Emmitsburg facility. Included on this LAN are the NETC Admissions System, the NETC Procurement System, and various other systems and data bases.

Acronym: NETCLRC
Title: NETC Learning Resource Center
Owner: FA-OP-TS
Description: This consists of software which provides a catalog of items in the collection of the Learning Resource Center.

Acronym: NETCMGT
Title: NETC Management
Owner: FA-OP-SA
Description: A computerized system that contains and reports information on Agency Senior Staff assignments and major organization changes at NETC.

Acronym: NETCPMS
Title: NETC Property Management System
Owner: FA-OP-SA
Description: A computerized system that contains and generates hand receipts, contains records and provides reports of all the personal property on the NETC campus.

Acronym: NETCPS
Title: NETC Procurement System
Owner: FA-OP-SA
Description: A computerized system that tracks the 40-1s generated at NETC, the 40-19s related to those 40-1s, and produces the related purchase orders.

Acronym: NETCScS
Title: NETC Security System
Owner: FA-OP-SA
Description: A computerized system that contains records of the daily activities of the security force and reports of incidents at NETC.

Acronym: NETCStS
Title: NETC Staffing System
Owner: FA-OP-OS
Description: A computerized system that contains and reports information related to all personnel duty stationed at the National Emergency Training Center.

Acronym: NETCVRS
Title: NETC Vehicle Registration System
Owner: FA-OP-SA
Description: A computerized system that contains records of all vehicles authorized to park on the NETC campus and information relative to individuals who have received parking violations on the campus.

Acronym: NFIP-AIS
Title: National Flood Insurance Program - Actuarial Information System
Owner: IA
Description: Analyzes the National Flood Insurance Program (NFIP), provides loss projections, establishes rates, facilitates access, and increases market penetration of actuarial analysis.

Acronym: NFIP-WYO
Title: National Flood Insurance Program - Write Your Own
Owner: IA
Description: Designed as a tool for maintaining financial and program control of the FIA Write Your Own program.

Acronym: NFIRS
Title: National Fire Incident Reporting System
Owner: FA-MT
Description: A standard package of forms, elements, codes, software, procedures, and manuals used for uniform data reporting methods by states to develop and report fire data to the National Fire Data Center (NFDC).

Acronym: NID
Title: National Inventory of Dams
Owner: MT-HZ-RA
Description: Provides information in support of Federal, State, and local water resource and emergency management planning. Provides management guidance to State and Federal agencies for the safety inspection of dams.

Acronym: OFW
Title: OSHALOG for Windows Manager Plus
Owner: HR
Description: Software used to track and report on-the-job injuries within FEMA.

Acronym: OTRS
Title: Official Time Reporting System
Owner: FA-OP
Description: A computerized data base that maintains and reports on official time used by Union officials as authorized by appropriate authority.

Acronym: PROTRAC
Title: Procurement Tracking System
Owner: FM-SR
Description: Automated system used to track purchase requests and purchase orders.

Acronym: RWS
Title: Revised Work Schedule
Owner: FA-OP
Description: A computerized system for the U.S. Fire Administration that maintains and reports on staff who are authorized to work a work schedule other than the standard work schedule.

Acronym: S&L
Title: Status of Studies and Letters
Owner: MT-HZ-ID
Description: Status of Studies and Letters – modules within the Community Information System (CIS) that track the status of flooding source re-studies and letter actions by community.

Acronym: SimLab
Title: Simulation Laboratory
Owner: FA-AC-TP
Description: A diverse set of simulation and distance education initiatives at the National Fire Academy accessible to firefighters nationwide via FEMA WAN. Will also be used at NETC as part of the program of instruction to provide interactive simulations of various incidents.

Acronym: SVIS
Title: Secure Video System
Owner: PT-TR-SS
Description: Provides secure video to users over the FEMA Switched Network (FSN) using 384 kbps of bandwidth. Provided upon request by the National Network Operations Center (NNOC).

Acronym: SVOS
Title: Secure Voice System
Owner: IT-SP-OV
Description: Consists of various types of encryption devices approved by the National Security Agency for the purpose of providing secure voice communications.

Acronym: TAMS
Title: Time Audit Management System
Owner: OIG
Description: Time and attendance auditing system used by the Office of the Inspector General.

Acronym: TIAS
Title: Training Information Access System: FEMA Bulletin
Owner: PT-TR
Description: Provides user access to EMI resident course schedules, rosters, IS statistics, and other data maintained on the NETC campus.

Acronym: TIMACS
Title: Telecommunications Information Management and Control System
Owner: IT-EN
Description: Provides user access for ordering all telecommunications service and equipment, tracks all services on order or in use, provides consolidated billing for services ordered, provides for the canceling of service when no longer required. The system also provides the full range of management services used by FEMA, including status of pending orders, cost/benefit analysis, requirements analysis, and standardized services at all FEMA locations.

Acronym: TMS
Title: Training Management System
Owner: PT
Description: Used to capture and monitor emergency management training data. Includes integration of CSEPP and SARA training requirements.

Acronym: Travel Manager
Title: Travel Manager
Owner: FM-SR
Description: Travel Manager is a COTS package that currently is being used in FEMA for preparation of travel vouchers. It is a document preparation package, with government travel regulations and related data, e.g., rates for reimbursement, built into it. Updates sometimes are received electronically from the vendor (GELCO), other times on diskette. The software runs on standalone PCs and on LANs, particularly at DFOs. During FY 1999, Travel Manager is to be interfaced with IFMIS so travel vouchers can be imported and paid directly without rekeying of the data.

Acronym: USRAS
Title: Urban Search and Rescue (US&R) Automated System
Owner: RR-OP-EC
Description: Computerized data base that includes civilian US&R task forces, individual US&R experts, canines, and equipment.

Acronym: VAR
Title: Visit Authorization Requests
Owner: OS-SY-PI
Description: Tracks requests for classified visits.

Acronym: WFM
Title: Workforce Management System
Owner: FM-SR
Description: Provides salary and payroll data for all non-disaster employees, including fiscal year-to-date pay and FTE usage data and projections to the end of the year.

Acronym: WMS/Thoroughbred
Title: Open Workshop Warehouse Management System
Owner: OS-PS-PP
Description: This is a Windows NT-based warehousing inventory and order control system that has the capability of accepting orders from anyone via the FEMA LAN, modem, fax, or Internet.

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Appendix E FEMA ITA Requirements Traceability Matrix (RTM)

This appendix provides the *FEMA IT Architecture* Requirements Traceability Matrix (RTM). The table below maps the requirements for an IT architecture as defined in OMB M-97-16 to various sections of the *FEMA IT Architecture*. Consistent with the development of an initial architecture, the *FEMA IT Architecture* has been developed to comply with the requirements of OMB M-97-16.

FEMA ITA Requirements Traceability Matrix	
Item	**Present/Absent/Comment**
1) Enterprise architecture: Explicit description of the current *and desired* relationships among business and management process and information technology. (italics added)	Section 1
a) Components of NIST model:	Sections 1.11 and 1.12
i) Business processes	Section 1.12.2
ii) Information flows and relationships	Section 1.12.3
iii) Applications	Section 1.12.4
iv) Data descriptions	Section 1.12.5
v) Technology infrastructure	Section 1.12.6
b) Components --	Section 1
i) OMB prescribes interrelationships among and priorities of these components only for business processes.	Section 1 (general)
ii) Aside from business processes, no hierarchy is implied.	Section 1 (general)
iii) For each component, document	Sections 1.9 and 1.10
(1) Current environment	Section 1.9
(2) Target environment	Section 1.10
c) Business processes: The foundation of the ITA.	Section 1.12.2
i) Should be developed by senior program managers in conjunction with IT managers.	"
ii) Decompose into derivative business activities. Keep at high level to allow broad agency focus, yet detailed enough to be useful in decision-making.	"
iii) Avoid excessive emphasis on modeling business processes.	"
d) Information flows and relationships:	Section 1.12.3
i) Describes relationships among various flows.	"
ii) Where is information needed, how is it shared to support missions functions?	"
e) Applications component:	Section 1.12.4

FEMA ITA Requirements Traceability Matrix	
Item	**Present/Absent/Comment**
i) Identifies, defines, and organizes activities that capture, manipulate, and manage the business information to support *mission* operations.	Section 1.12.4
ii) Describes logical dependencies and relationships among business activities.	"
f) Data descriptions and relationships:	Section 1.12.5
i) Can include data models.	"
ii) Identify data that can be shared corporately, for minimizing redundancy, for supporting new applications.	"
g) Technology infrastructure – physical layer, wiring diagram. Includes functional characteristics, capabilities, and interconnections of	Section 1.12.6
i) Hardware	"
ii) Software	"
iii) Communications (including networks, protocols, nodes)	Section 3
2) Technical Reference Model and standards profiles	Section 2
a) Standards:	"
i) enable interoperability, portability, and scalability in systems throughout agency.	"
ii) must be consistent throughout agency.	"
iii) Basis of development of components of Enterprise Architecture, guide and constrain IT asset acquisitions.	"
b) Technical Reference Model (TRM): identifies and describes information services (e.g., data base, communications, security services) used throughout agency. OMB does not identify the services but gives one example, Information Interchange Services.	Section 2.2
c) Standards profile:	Section 2.3
i) Defines a set of IT standards that support the services articulated in the TRM.	"
ii) Published set of standards or source references for standards that prescribe interfaces between those services that will be standards-based.	"
iii) May contain specifications that describe technical standards that enable a service.	"
d) Agencies are expected to adopt minimum standards necessary to support all components of desired Enterprise Architecture.	Section 2
e) Standards should address	Sections 2 & 3

FEMA ITA Requirements Traceability Matrix	
Item	**Present/Absent/Comment**
i) Hardware	Sections 2 & 3
ii) Software	"
iii) Communications	"
iv) Data management	"
v) User interfaces	"
vi) Implementation approaches	"
f) Security standards profiles	Section 2.4
i) Important. Need not be separate component of Enterprise Architecture or TRM.	"
ii) Security standards profiles are standards profiles specific to security services specified in the Enterprise Architecture and cover services, e.g.,	Section 2.4.3
(1) Identification	"
(2) Authentication	"
(3) Non-repudiation	"
(4) Audit trail creation and analysis	"
(5) Access controls	"
(6) Cryptography management	"
(7) Virus prevention	"
(8) Fraud prevention	"
(9) Detection and mitigation	"
(10) Intrusion, prevention, detection	"
iii) Must be consistent with requirements of OMB Circular A-130, Appendix III.	Section 2.4
3) Maintaining and implementing ITA	Section 4
a) Clinger-Cohen calls for implementation, not development.	"
b) Prioritize areas of high incremental benefits for early implementation.	"
c) Areas to give particular attention to are:	"
i) Change management	Section 4.2.1
(1) ITA development iterative, dynamic.	"
(2) Revise ITA periodically so it evolves as agency's business functions evolve.	"
(3) Management ITA with same change control process that governs other critical documents.	"
(4) Baseline of current environment should be maintained over time.	"

FEMA ITA Requirements Traceability Matrix	
Item	**Present/Absent/Comment**
(5) Every agency should have mechanism for evaluating current technologies and for identifying new IT opportunities for agency.	Section 4.2.1
(6) OMB suggests a board to act as steward of ITA and to perform ITA development and maintenance activities.	Section 4.2.1
ii) Legacy systems integration	Sections 4.2.3 and 4.2.4
(1) Architectural strategy for dealing with legacy systems should focus on their interfaces with new systems.	"
(2) Don't compromise ability of a new system to conform completely to target architecture and standards.	"
iii) IT personnel planning	Section 4.2.6, 4.2.10, and 4.2.12
(1) ITA should reflect training, procedures, staffing needed to support successful implementation.	Section 4.2.10
(2) Identify human resources and technical skills needed and available to develop, maintain, and implement ITA.	Section 4.2.6
(3) Plan for remediation of deficiencies.	Section 4.2.6 and 4.2.10
iv) Compliance, waivers, certification	Section 4.2.13
(1) Compliance critical.	"
(2) Configuration changes should be tested and validated prior to acceptance.	"
(3) Don't weaken ITA via waivers. Require strong business case justifications for exceptions to ITA.	"
(4) Establish metrics which, if met, permit a proposed system to be termed *ITA compliant*.	"

Appendix F High-Level Discussion and Analysis of FEMA Information Flow Requirements

This appendix provides a high-level discussion and analysis of FEMA's information flow requirements and provides amplification to Section 1.12.3. It is organized by directorate or administration. Where applicable, missions for subordinate divisions are included.

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Office of the Director		Provide leadership and direction to reduce the loss of life and property from all types of hazards through a comprehensive, risk-based, all-hazards emergency management program of mitigation, preparedness, response, and recovery.	Needs data from FEMA organizational elements about disasters (such as extent of damage, casualties, etc.) to brief the President. Provides policies and directives. Submits budget and other agency documents such as *Strategic Plan* in response to public law and other agency directives (e.g., OMB, GAO, GSA). Needs broad information about other Federal agencies, State, Regional, and local governments and their roles, responsibilities, and capabilities as they impact FEMA. Also, needs broad information on hazards, risks, disasters, etc. as they impact major missions of mitigation, preparedness, response, and recovery. Needs broad information on flood insurance issues, fire-fighting issues, technology (e.g., GIS, IT systems, communications), risks, grants management process, and legal and regulatory issues.
Office of Congressional and Legislative Affairs		Coordinate FEMA's ongoing emergency management dialogue with the U. S. Congress, and coordinate implementation of FEMA's legislative program.	Needs broad information to support all aspects of FEMA management of Congressional and legislative affairs including (but not limited to): • Congressional points of contact and their districts • Congressional correspondence (input/output) especially from Members with active crises or disasters in their States and Districts • Identification and tracking of pertinent FEMA Congressional legislation and legislative issues • Briefings as they relate to Congress • FEMA grants information as it relates to grants in a Member's District or State

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Office of Emergency Information and Media Affairs		Disseminate response and recovery information to the public and news media during and after natural disasters and other emergencies; inform and educate the public about emergency preparedness; and inform the public and constituent groups about FEMA's activities.	Needs to maintain close liaison with Mitigation, R&R, PT&E Directorates (especially) to receive and process information about the scope and extent of: disasters, response and recovery efforts, grants, and mitigation activities. Scans nationwide newspapers and clips items of interest for FEMA. Provides information to the media and the public including: • Press releases, advisories, fact sheets, and *backgrounders* • Emergency information (e.g., audio, video, photographic, television, radio, Internet streaming of multimedia) • *Recovery Channel* and *Recovery Times*
Office of Policy and Regional Operations		Support the Director and Agency managers by conducting agency-wide planning, developing policy, and implementing strategic initiatives; ensuring Regional coordination; and building partnerships with and among State and local governments, non-government organizations, and business and industry.	Needs to maintain close liaison with Regional Offices to understand issues and requirements. Develops and promulgates plans (such as the *Annual Performance Plan*), policies, standards, and procedures. Needs information about: States, Regions, local governments, other Federal agencies, voluntary organizations, etc. to establish policies and directives associated with FEMA partnerships and performance agreements. Increasingly concerned about handling of information associated with environmental and cultural issues associated with disaster and non-disaster operations. Needs to develop improved capabilities for disaster correspondence tracking. (Note: OP is gaining the FEMA Disaster Correspondence Unit.) Needs inputs on public laws, directives, and policies as they impact FEMA and the flow of information both within, and external to, FEMA. (Example: What is required structure and content of performance reports for reporting on grants to States to meet GPRA requirements?).

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Office of National Security Affairs		Serve as the focal point for FEMA activities related to terrorism, special programs, COG, COOP, and CIP, by ensuring coordination of these activities within the Agency and with appropriate Executive Branch organizations through uniform and consistent national security policy in an all-hazards environment.	The Office of National Security Affairs (NS) processes information in an unclassified and classified mode. NS manages the development and publication of national security-related documentation, including final versions, drafts, revisions, updates, and comprehensive guidance regarding policies, operational plans, and programs in the areas of terrorism, special programs, COG, COOP, and CIP. Additionally, NS coordinates the development and distribution of documents and comprehensive guidance to internal FEMA customers, the Regions, and other Executive Branch departments and agencies.
Office of the Inspector General	Office of the Inspector General	Serve as an independent and objective audit, investigative, and inspection unit relating to FEMA programs and operations for the purpose of promoting economy, effectiveness, and efficiency, or preventing and detecting fraud, waste, and abuse in FEMA programs and operations.	The requirements for information and information flow associated with business functions of the Office of the Inspector General (OIG) are broad and encompassing. In general, OIG needs access to plans, policies, procedures, public law, directives, standards, etc. that impact FEMA's operations. OIG conducts audits, inspections, and investigations as related to these type of documents. Sources of data and information for audits, inspections, and investigations include (but are not limited to): interviews, agency records, documents, budget documents, grants data, reports, personnel records, electronic records in IT systems, correspondence, external agency requests OIG actions, and other sources as identified by OIG. With due regard for security and privacy issues, OIG produces reports and findings associated with audits, inspections, and investigations.
	Audits Division	Supervise, conduct, coordinate, and oversee the performance of all auditing activities relating to programs and operations within FEMA.	
	Inspection Division	Plan and conduct inspections of FEMA policy, programs, and operations. Recommend changes and improvements for effectiveness and efficiency.	
	Investigations Division	Conduct investigations relating to FEMA personnel, programs, and operations consistent with the *IG Act of 1978*, as amended.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Office of Human Resources Management	Office of the Director	Plan and direct human resources programs to maintain a workforce capable of delivering the Agency's assigned mission while advancing the Agency's commitment to its employees and the public.	The Office of Human Resources Management (OHRM) has broad and demanding information flow requirements with regard to its assigned personnel management business functions. OHRM supports both disaster- and non-disaster-related operations for headquarters and field personnel. OHRM derives inputs from public laws, policies, and directives (especially from OPM). The representative types of information that must flow to/from OHRM includes (but is not limited to): • Time & attendance data from employees • Personnel data (includes case files on disciplinary actions and employee performance data) • Availability data and rosters for Emergency Response Teams (ERTs) • Library of FEMA employee duties and responsibilities and any shifts in assigned duties and responsibilities • Payroll data • Recruitment data • Personnel logistics data OHRM produces Plans, Polices & Procedures Newsletters, Reports, Guides, and Handbooks. Using IT systems, OHRM maintains a corporate data base of human resources information as an enterprise-wide capability to support mitigation, preparedness, response, and recovery operations for other FEMA organizational elements. Please see the discussion on the OHRM corporate data base in Section 1.12.4 for other information flow aspects implicit with this data base.
	Headquarters Personnel Operations Division	Manage, direct, and evaluate human resources management programs in the areas of position management, classification, recruitment, internal placement, pay, and leave administration for assigned organizational segments of FEMA.	
	Field Personnel Operations Division	Manage, direct, and evaluate human resources management programs in the areas of position management, classification, recruitment, internal placement, pay, and leave administration for assigned organizational segments of FEMA.	
	Employee and Labor Relations Division	Manage, direct, and evaluate human resources management programs in the areas of employee relations, labor relations, performance management, and employees benefits.	
	Disaster Personnel Operations Division	Manage, direct, and evaluate human resources management programs in the areas of position management, classification, recruitment, internal placement, pay, and leave administration for assigned organizational segments of FEMA. Manage and direct operational aspects of the Automated Deployment Data Base (ADD).	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Office of Equal Rights		Serve the Agency and the nation by promoting affirmative employment, a discrimination-free workplace, and equal access to FEMA programs and benefits.	The Office of Equal Rights (ER) has significant information flow requirements associated with its assigned mission requirements. ER derives inputs from equal rights public laws, policies, and directives (especially from EEOC). ER must frequently work closely with, and exchange information with: OHRM, the Office of General Counsel, and Office of the Inspector General. The representative types of information that must flow to/from ER includes (but is not limited to) the following: • FEMA equal rights data (including complaints, actions, disputes, legal records, notes of interviews, etc.) • Equal Employment Opportunity Commission (EEOC) reports and statistical data • Alternative dispute resolution data

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Office of Financial Management	Office of the Chief Financial Officer	Promote sound financial management and accountability throughout the Agency by providing financial and acquisition related guidance, information, and services to FEMA management and the Agency's customers.	The Office of Financial Management (OFM) has a very large and demanding information flow requirement associated with its assigned mission responsibilities, especially under the *Chief Financial Officer (CFO) Act*. OFM supports all other FEMA Directorates and Administrations. Implicit in providing this support are required inputs and outputs. OFM derives inputs from public law, plans, policies, and procedures. OFM develops and promulgates: financial management rules and regulations; financial reports and analyses, financial management goals and objectives, standard operating procedures, training materials, and the FEMA Five Year Financial Management Plan. OFM's primary IT system is IFMIS. Please see the discussion on IFMIS in Section 1.12.4 for other information flow aspects implicit with this system. Representative types of information that must flow to/from OFM includes, but is not limited to: • Disaster Relief Fund data and expenditures • Budgetary documents from FEMA organization elements • ERT and Emergency Support Team (EST) financial management data • Acquisition data and documents • User requirements documents • Grants financial management data • Agency credit card data • Payment and disbursement data • Accounts payable and receivable data • Grant awards payment data • Vendor lists • Solicitations and Requests for Proposals (RFPs) • Contracts, Purchase orders, Contract modifications, and Contract tasks data
	Financial Planning and Analysis Division	Provide budget services and status of resources information to Agency management and in response to external inquiries and requirements.	
	Financial Systems and Reports Division	Provide financial reports and systems information to FEMA management and the Agency's customers, and provide technical ADP and functional support to all FM components.	
	Financial Operations Division	Provide Agency-wide financial operational support.	
	Financial Policy Division	Provide financial management policy guidance, assistance, and training to internal and external customers and recommend improvements in the delivery of financial services.	
	Acquisition Services Division	Provide and evaluate acquisition policies and procedures, training, and warrant programs for procurement personnel Agency-wide, and provide acquisition support services to internal and external customers.	
	Acquisition Operations Division	Provide Agency-wide acquisition and provide direct contracting support for the Agency's major programs.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Office of General Counsel	General Law Division	As a staff element of the FEMA, the Office of the General Counsel renders legal advice and assistance on all matters related to Agency programs and operation.	The Office of General Counsel (OGC) has significant information flow requirements associated with its assigned mission requirements. OGC derives inputs from all public laws that impact FEMA, rules and regulations, policies, and directives. OGC has a particular requirement for information and data that can meet legal, regulatory, and archival standards as determined by the Department of Justice and the Courts. OGC also renders legal opinions for FEMA. The representative types of information that must flow to/from OGC includes (but is not limited to) the following: • Legal opinions (input and output) • Programmatic data for FEMA assigned programs and grants • Rules and litigation dockets and data • *Federal Register* inputs and data • White papers (input and output) • Memoranda of Understanding (MOU) • Litigation case files • *Freedom Of Information Act (FOIA)* requests, documents, and data • Legal correspondence (input and output)
	Program Law Division		
	Litigation Division		

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Mitigation Directorate	Office of the Associate Director	Develop, coordinate, support, and implement policies, plans, and programs to eliminate or reduce the long-term risk to human life and property from natural and technological hazards; and to support the Director in making mitigation the cornerstone of emergency management. Provide leadership, management, and direction of the *Project Impact* initiative to create disaster resistant communities nationwide	The Mitigation Directorate (MT) has a large and demanding information flow requirement associated with its assigned mission responsibilities. The guiding document for defining the high-level information flow requirements associated with mitigation business functions is the *National Mitigation Strategy*. MT derives inputs from public law, plans, policies, and procedures. Representative types of information that must flow to/from MT includes, but is not limited to: • Grants management data • *Project Impact* data • Mitigation correspondence • Mitigation training materials • Scientific and technical reports, handbooks, and manuals; and special studies and reports • Mitigation documents and guidance materials • Geographic Information System (GIS) data • Floodplain data • Mapping products • Building code data • Hazards data • Risk assessment data and documents • National Flood Insurance Program data MT develops and promulgates: mitigation inputs to the FRP; the *National Mitigation Strategy*; policy, strategies, guidance, and standards relating to all hazards; mitigation training materials; and mitigation rules and regulations. Additional aspects of mitigation information flow are addressed in Section 1.12.1. The Mitigation Directorate is a major user of NEMIS. Information flow aspects of mitigation implicit to NEMIS are addressed in Section 1.12.4.
	Program Assessment and Outreach Division	Support the Associate Director in the coordination and support of innovations that encourage and foster a multi-hazard, community-based approach to mitigation activities at the Federal, State, and local levels by both governmental and private sector entities. Develop policy guidance to support those activities and assess their success in reducing losses. Develop information dissemination and awareness efforts to educate the private sector and Federal, State, and local government officials about FEMA's mitigation principles and programs, in particular *Project Impact*	

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Mitigation Directorate (cont.)	Program Support Division	Support the Associate Director in the implementation of policies, plans, and programs to eliminate or reduce the risk and impact of natural hazards on human life and property. Emphasize a multi-hazard approach to mitigation activities at the Federal, State, and local level, working in partnership with governmental, private sector, and volunteer entities	
	Hazard Technical Service Division	Support the Associate Director in the establishment in conjunction with FEMA's Regional Offices, of a nationwide, map-based Hazard Study and Mapping Program, which forms the foundation for FEMA's National Mitigation Strategy, and which supports Federal, State, and local emergency management and hazard mitigation interests through the provision of useful products and information.	
	National Earthquake Program Office	Increase the national capability to save lives and property, and limit the social and economic disruptions from earthquakes through inter-agency strategic planning and program coordination; improved linkages between research, technology transfer and implementation; informing and educating the public; and improving the cross-fertilization of earthquake loss-prevention and mitigation techniques between the Federal and State and local governments and the private sector.	

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Preparedness, Training, and Exercises Directorate (in the process of being re-organized)	Office of the Associate Director	Provide the leadership, policy, financial and technical assistance, training, and exercise support required to establish or enhance the emergency management capabilities of Federal, State, and local governments. Develop and implement customer service initiatives;	The Preparedness, Training, and Exercises (PT&E) Directorate (PT&E) has a large and demanding information flow requirement associated with its assigned mission responsibilities. PT&E is in the process of being re-organized and has assumed the customer service function from OP. PT&E derives inputs from public law, plans, policies, and procedures. PT&E develops and promulgates standards for FEMA partners, Regions, States, and local government, relating to preparedness, training, and exercises. Representative types of information that must flow to/from PT&E includes, but is not limited to: • Lessons learned on exercises and training events • Budget requests and budgetary data • Correspondence • Chemical Stockpile Emergency Preparedness Program (CSEPP) data • Radiological Emergency Preparedness (REP) data • Inter-agency MOUs and MOAs • Exercise plans, reports, and data packages • Training plans and data • Regional, State and local disaster plans • Exercise results and after action reports • Grants and grant management data • Training materials • Customer service data and information • Media (TV productions, tapes, etc.) • Corrective Action Program data and reports • Nuclear and environmental plans, policies, and procedures relating to the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC) • National defense preparedness data • COG & COOP exercise documents and data
	State and Local Preparedness Division	Develop and manage programs that provide funding assistance to State and local governments to build integrated emergency management programs.	
	Training Division	Provide national leadership in the development and delivery of training necessary to ensure that individuals and groups with key emergency management responsibilities, including FEMA employees, have the requisite skills to perform their jobs effectively.	
	Exercises Division	Improve the ability of Federal departments and agencies, State and local governments, volunteer organizations and the private sector to respond to emergencies through a comprehensive all-hazard, multi-scenario exercise program.	
	Resources Preparedness & Capabilities Division	Support the Director and agency managers by developing and coordinating integrated policy, planning, and analysis on issues related to Federal resources preparedness and capabilities programs and activities under the *National Security Act*, the *Defense Production Act*, and international treaties.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Preparedness, Training, and Exercises Directorate (cont.)	Mt. Weather Management Division	Manage the Mt. Weather Emergency Assistance Center, which is a focal point for support of disaster response tele-registration operations and training, exercises and simulation activities designed to improve the all-hazards capabilities of Federal, State and local government emergency managers.	

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Response and Recovery Directorate	Office of the Associate Director	Develop and maintain an integrated operational capability to respond to and recover from the consequences of a disaster, regardless of its cause, in partnership with other Federal agencies, State and local governments, volunteer organizations, and the private sector.	The Response and Recovery Directorate (R&R) has a large and demanding information flow requirement associated with its assigned mission responsibilities. The *Federal Response Plan* is the guiding document for R&R operations. Major elements of information flow are defined within the 12 Emergency Support Functions (ESFs) in the FRP. Section 1.12.2 also describes information flow requirements. R&R is a major user of enterprise IT systems such as NEMIS. See Section 1.12.4 for R&R info flows implicit to IT systems. R&R derives inputs from public law, plans, policies, and procedures. Representative types of information that must flow to/from R&R includes, but is not limited to: • Budget requests and budget data • Grants and grant management data • Correspondence • FRP data (e.g., ESF data) • Briefings and presentation materials • After action reports • Presidential Disaster Declarations • Response and recovery programmatic data for assigned programs • Mobile Emergency Response System (MERS) and Mobile Air Transportable Telecommunications System (MATTS) readiness data • Facilities and operations center readiness data • Situation reports • GIS data to support response and recovery • Inspection reports • Human services data • Data contained in Network Emergency Management Information System (NEMIS) • List of volunteer agencies and capabilities
	Readiness Coordination Division	Manage and lead the development, coordination, and implementation of policy, standards, and disaster evaluation systems within the Response and Recovery Directorate. Oversee Federal disaster declaration policy and processing. Manage disaster operations program and customer satisfaction surveying.	
	Operations and Planning Division	Maintain and expand the Federal Response Plan and provide leadership in integrating and linking all Federal disaster response and recovery plans into an integrated system to support State and local response to all disasters. Develop, maintain and implement emergency operations procedures and procedural guidance in support of the Agency's operational role in natural, technological, and man-made disasters.	
	Infrastructure Division	In coordination with applicants, conduct public assistance activities related to the repair or rehabilitation of qualifying public and certain private non-profit facilities.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Response and Recovery Directorate (cont.)	Human Services Division	Ensure that individuals and families that have been affected by disasters have access to the full range of FEMA Human Services programs in a timely manner and that the best possible level of service is provided to applicants in the administration of these programs. This also includes developing partnerships with the States, voluntary organizations, the private sector and other federal agencies that are delivering similar kinds of assistance to the same groups of individuals.	
	Mobile Operations Division	Maintain deployable systems, such as the Mobile Emergency Response Support (MERS) and the Mobile Air Transportable Telecommunications System (MATTS), needed to support the response activities called for by the FEMA All Hazard Mission.	

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
Federal Insurance Administration	Office of the Administrator	Manage a Federal program to provide consumer-oriented flood insurance in participating communities.	The Federal Insurance Administration (FIA) has all of the information flow requirements of a major insurance corporation and insurance underwriter – including marketing, operations, finance, underwriting, and claims management. FIA derives inputs from public law (especially the National Flood Insurance Program), plans, policies, and procedures. FIA promulgates rules and regulations. Representative types of information that must flow to/from FIA includes, but is not limited to: • Write Your Own (WYO) programmatic data • Marketing materials (e.g., brochures, publications, videos, displays, advertising) • Audit data and reports • Budget requests and budget data • Actuarial data • Historical reports and data • GIS floodplain data and maps (e.g., Q3 FIRM maps) • Underwriting data • Insurance transaction data • TRRP plan statistical transaction data • Community Master File information • Condominium inspector data • Financial statements • Policy and claims data and detailed data • Financial data • Repetitive loss data • Property address data • Training materials
	Operations Division	Manage contracted resources by providing technical direction to contractors supporting the National Flood Insurance Program, the NFIP Telemarketing Center, and the NFIP Distribution Center.	
	Financial Division	Manage the financial processing and accounting for the Federal Insurance Administration. Prepare the budget and the financial plan for each program, each fiscal year and coordinate them with FEMA Office of Financial Management.	
	Marketing Division	Manage a comprehensive marketing program to increase the policy base, and coordinate it with the Write Your Own Companies and lender Community to increase the sale of insurance and facilitate less uninsured losses by the public. Provide personnel, training, and correspondence management support to the FIA.	
	Underwriting and Claims Division	Manage the claims and underwriting functions of the FIA controlled insurance programs. Manage the insurance rulemaking process and develop policy and guidance for operation of the insurance programs.	

Directorate or Administration	Division (if applicable)	Mission Statement	High-Level Discussion of Information Flow Requirements
United States Fire Administration	Office of the Administrator	Provide national leadership at the Federal level to reduce losses due to fire through coordination, direction, control and administration for the Agency's fire programs that include fire incident data collection and analysis, fire research and technology transfer, public fire safety awareness and education, and training and education for the fire service and allied professions.	The United States Fire Administration (USFA) has all of the major information flow requirements of a scientific and engineering organization (specializing in fire studies, operations, and management) as well as a college (or university) for support of the National Fire Academy. Information flow requirements can be time-critical for fire suppression operations. USFA derives inputs from public law (including specialized programs/grants), plans, policies, and procedures. USFA promulgates rules and regulations and has a significant requirement for information dissemination to the public and the fire management community. Representative types of information that must flow to/from USFA includes, but is not limited to: • National Fire Incident Reports (NFIR) and data • Training materials • Training goals and objectives • Fire-related technical library materials • Technical reports and white papers • Simulation and multimedia materials • Facilities management data • Building codes and standards • Admissions and enrollment data • Curriculum materials • Fire-related standards • Public information materials • Grants and grant management data • Correspondence
	Fire Management and Technical Programs Division	Direct programs to determine potential solutions to the national fire problem. Update the understanding of the national fire problem through collection and analysis of incident data collected from local fire departments. Support research into fire protection solutions and technology transfer for safer building and firefighting operations. Direct national public education program to assist State and local authorities in reducing fire losses and promoting personal responsibility.	
	Management Operations and Student Support Division	Manage and operate the National Emergency Training Center (NETC) in support of the United States Fire Administration (USFA), the Emergency Management Institute (EMI), and the Field Personnel Operations Division, Office of Human Resources Management. Provide all non-academic student services including library, admissions, transcript, housing, transportation, and food service.	
	National Fire Academy	Provide national education programs for the fire service and allied professions.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Operations Support Directorate	Office of the Associate Director	Provide logistics, security, health and safety, and other mission support services essential to the accomplishment of the Agency's all-hazards emergency management program.	The Operations Support Directorate (R&R) has a large and demanding information flow requirement associated with its assigned mission responsibilities including: logistics management and operations, occupational safety and health, Agency legal and archival records management, and security operations. OSD is a major user and developer of LIMS. See Section 1.12.4 for information flows implicit to LIMS. OSD derives inputs from public law, plans, policies, procedures, and directives (e.g., OMB, NARA, GSA, GPO). Representative types of information that must flow to/from OSD includes, but is not limited to: • Occupational safety and health data • Agency electronic records • Agency publications in electronic format • Agency publications (hardcopy) maintained in warehouse and data on availability • Agency logistics readiness data and LIMS data • Personnel security information and data • Facilities security data • Budget requests and budget data • Correspondence • Data associated with: - Transit Subsidy Program - Federal Ride Sharing Program - Committee Management Program - Records Management Program • Facilities engineering drawings • National security data
	Occupational Safety and Health Program Office	Plan, develop, implement, and administer an agency-wide safety and occupational health program.	
	Program Services Division	Provide operational services support and service to all FEMA employees, the emergency management community, and the public to ensure successful accomplishment of FEMA's all-hazards mission.	
	Logistics Division	Provide logistics support in the areas of property management, logistics systems, and disaster operations for FEMA and its emergency management partners.	
	Security Division	Provide protection for personnel, facilities, and equipment to ensure a secure environment for FEMA and its emergency management partners.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Information Technology Services Directorate	Office of the Chief Information Officer	Provide agency-wide support for information technology services and systems for routine operations and in all-hazards emergency and disaster situations. Provide leadership and direction for management of information technology resources, automated data processing (ADP), telecommunications and information services and systems necessary to support and accomplish FEMA's mission.	The Information Technology Services (ITS) Directorate has a large and demanding information flow requirement associated with its assigned mission responsibilities. These include: development and integration of NEMIS and other IT systems, program support for IT systems, IT and network systems engineering, configuration management, and IT systems and network operation. ITS derives inputs from public law (especially the ITMRA and GPRA), plans, policies, procedures, and directives. Representative types of information that must flow to/from ITS includes, but is not limited to: - Budget requests and budget data - Correspondence - Information technology (IT) systems documents - IT systems and network CM data - Data dictionary standards and models - Help desk materials and trouble ticket data - Interface Control Documents (ICDs) - Year 2000 compliance data - Information Resource Board (IRB) documents - GPRA reporting data - Procurement data - Capital plans, budgeting, and investment data - IT systems technical reports - RF spectrum management and call sign data - TIMACS data - On-line FEMA Telephone Directory - ITS requirements documents - IT systems test and evaluation reports and data - Engineering studies and analyses - Cryptographic equipment data - Electronic key management data - Equipment inventory data - Security architecture data - Enterprise security management data/documents
	Program Management Group	Provide leadership and direction for the management, development acquisition, and implementation of designated major agency-wide information technology programs. Define and coordinate requirements then research the technology for the most effective solutions to satisfy those major program requirements. Provide leadership and direction for major program efforts having cross-cutting implications for the Information Technology Services Directorate.	
	Management Division	Provide leadership and direction for administration, policy-making, planning, contracting, configuration and resources management of FEMA's information technology. Serve as the central point for the Agency's Information Resources Management program.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Information Technology Services Directorate (cont.)	Operations Division	Provide information technology capabilities to FEMA, other Federal Agencies, and State and local governments in support of FEMA's all-hazards mission by managing, operating, and maintaining FEMA's information systems, networks, and information technology services centers.	
	Engineering Division	Provide integrated information systems analysis, design, development, test and implementation, re-engineering of existing information systems, information technological investigation and engineering, LAN/WAN engineering, information systems security leadership for the agency, design, develop and deploy and implement disaster information technology systems at FEMA fixed locations and disaster facilities.	

Directorate or Administration	**Division** (if applicable)	**Mission Statement**	**High-Level Discussion of Information Flow Requirements**
Regional Offices	Mitigation Division Preparedness, Training and Exercises Division Response and Recovery Division Operations Support Division	Accomplish within the Region, the national program objectives established for the Agency by the Director. Establish an all-hazards approach to emergency management throughout the Region through close working relationships with other Federal agencies, State, and local governments, private industry and local volunteer organizations in the implementation of FEMA policies and programs.	In general, the 10 Regional Offices have many of the same information flow requirements as the major directorates and administrations identified above. This largely reflects an organizational structure within the individual Regional Offices that mirrors FEMA Headquarters. In particular, the Regional Offices have divisions for: • Mitigation • Preparedness, Training, and Exercises • Response and Recovery • Operations Support The reader is referred to the discussions of these directorates for a description of the major information flow requirements broadly applicable to the Regions. For the Regional Offices, the information flows must be: 1. Upward back to FEMA Headquarters; 2. Out to Disaster Field Offices and field personnel within the Region; 3. Out to States and local government serviced by the Regional Office; 4. Among each other for sharing lessons learned and especially for mutual mitigation support; and 5. Out to external partners and agencies operating within the Region

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Appendix G FEMA Enterprise Documents and Data Stores

This appendix identifies the major document and data stores maintained by various FEMA organizational elements. It is organized by directorate or administration and provides amplification to Section 1.12.4.

FEMA Organization	Documents and Data Maintained
Office of the Director	- Policies and Directives - Presidential Briefings - White Papers - Budgetary Documents - Instructions
Office of Congressional & Legislative Affairs	- Congressional Points of Contact and District Locations - Congressional Correspondence - Pertinent FEMA Congressional Legislation - Briefings - Legislative Issues - Legislative Tracking Data

Office of Emergency Information and Media Affairs	- Press Releases
	- Emergency Information
	  - Audio
	  - Video
	  - Photographic
	  - Television
	  - Radio
	  - Internet streaming of multimedia
	- *Recovery Channel* Archives
	- *Recovery Times* (newspaper archives)
	- Advisories, Fact Sheets, and *Backgrounders*
	- Library of Audiovisual Materials
	- Newsletters
	- Nationwide News Clippings

Office of Policy & Regional Operations	- Plans and Policies - Standards - *Government Performance and Results Act (GPRA)* Reporting Policies - Correspondence (per Disaster Correspondence Unit) - Cooperative Agreements - Regional Views and Issues Documents - Performance Plans and Agreements - Partnership Memoranda of Understanding

FEMA Organization	Documents and Data Maintained
Office of National Security Affairs	- Plans, Policies, and Procedures - National Security Briefings - Comprehensive Terrorism-Related Guidance - Budgetary Documents and Reports - Special Programs, Policies, and Operational Plans - COG, COOP, and CIP Documents & Plans - Correspondence - White Papers
Office of Inspector General	- Audit Reports and Data - Investigation Reports - Inspection Reports - OIG Budget - OIG Policies and Procedures - Audit Proceedings and Guide - Financial Statements - Inspections Policies, Procedures, and Guide - Investigations Polices, Procedures, and Guide - Correspondence
Office of Human Resources Management	- Time & Attendance Data - Personnel Data (includes Case Files on Disciplinary Actions) - Plans, Policies, and Procedures - Rosters for Emergency Response Teams (ERTs) - Availability Data For ERTs - Employee Performance Data - Correspondence - Library of FEMA Employee Duties and Responsibilities - Payroll Data - Recruitment Data - Personnel Logistics Data - Newsletters, Reports, Guides, and Handbooks
Office of Equal Rights	- Equal Rights Legislation, Polices, and Procedures - Correspondence - FEMA Equal Rights Data - Equal Employment Opportunity Commission (EEOC) Reports - Alternative Dispute Resolution Data

FEMA Organization	Documents and Data Maintained
Office of Financial Management	- Plans, Policies, and Procedures - Disaster Relief Fund Data - Budgetary Documents - Correspondence - Financial Management Rules and Regulations - ERT and Emergency Support Team (EST) Financial Management Data - Acquisition Data and Documents - Financial Reports and Analyses - Financial Management Information System Goals and Objectives - Training Materials - Inventory of Financial Management Systems - User Requirements Documents - Grants Financial Management Data - Agency Credit Card Data - Standard Operating Procedures for Financial Management - Payment and Disbursement Data - Accounts Payable and Receivable Data - Grant Awards Payment Data - Vendor Lists - Five Year Financial Management Plan - Solicitations and Requests For Proposals - Contracts - Purchase Orders - Contract Modifications - Contract Tasks Data
Office of General Counsel	- Plans, Policies, and Procedures - Rules and Regulations - Legal Opinions - Rules and Litigation Dockets - *Federal Register* Inputs and Data - White Papers - Legislation and Directives - Memoranda of Understanding (MOU) - Litigation Case Files - *Freedom Of Information Act (FOIA)* Requests, Documents, and Data - External Directives and Instructions - Legal Correspondence

FEMA Organization	Documents and Data Maintained

Mitigation Directorate	- Plans, Policies, and Procedures
	- Grants Management Data
	- *Project Impact* Data
	- Mitigation Correspondence
	- Mitigation Training Materials
	- Technical Reports, Handbooks, & Manuals
	- Mitigation Documents & Guidance Materials
	- Geographic Information System (GIS) Data
	  - Floodplain Data
	  - Mapping Products
	- Building Code Data
	- Hazards Data Base
	- *National Mitigation Strategy*
	- Mitigation's Input to the *Federal Response Plan* (FRP)
	- Policy, Strategies, Guidance, Standards Relating to All Hazards
	- Mitigation Rules and Regulations
	- Risk Assessment Data and Documents
	- National Flood Insurance Program Data
	- Library of Special Studies and Reports

Response and Recovery Directorate	- Plans, Policies, and Procedures - Budget Requests and Budget Data - Grants and Grant Management Data - Correspondence - Standards for Response and Recovery - FRP Data (e.g., Emergency Support Function (ESF) Data) - Briefings and Presentation Materials - After Action Reports - Presidential Disaster Declarations - Response and Recovery Programmatic Data - Mobile Emergency Response Support (MERS) Readiness Data - Facilities and Operations Center Readiness Data - Situation Reports - Response and Recovery GIS Data - Inspection Reports - Human Services Data - Data contained in Network Emergency Management Information System (NEMIS) - List of Volunteer Agencies and Capabilities

FEMA Organization	Documents and Data Maintained
Preparedness, Training, and Exercises Directorate	- Plans, Policies, and Procedures - Lessons Learned - Budget Requests and Budget Data - Correspondence - Chemical Stockpile Emergency Preparedness Program (CSEPP) Data - Radiological Emergency Preparedness (REP) Data - Inter-agency MOUs and MOAs - Exercise Plans, Reports, and Data Packages - Training Plans and Data - Regional, State and Local Disaster Plans - Exercise Results and After Action Reports - Grants and Grant Management Data - Training Materials - Library of Media (TV productions, tapes, etc.) - Corrective Action Program Data and Reports - Standards Relating to Preparedness, Training, and Exercises - Nuclear & Environmental Plans, Policies, and Procedures Relating to the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC) - National Defense Preparedness Data - COG and COOP Exercise Documents and Data - Capability Assessment for Readiness (CAR) Documents and Data - Customer Service Initiative Documents and Data
United States Fire Administration	- Plans, Policies, and Procedures - National Fire Incident Reporting Data - Training Materials - Training Goals and Objectives - Fire-Related Technical Library - Technical Reports and White Papers - Simulation and Multimedia Materials - Facilities Management Data - Library of Building Codes and Standards - Admissions and Enrollment Data - Fire-Related Standards - Public Information Materials - Grants and Grant Management Data - Correspondence

FEMA Organization	Documents and Data Maintained

Federal Insurance Administration	- Plans, Policies, and Procedures
	- Rules and Regulations
	- Correspondence
	- Write Your Own (WYO) Programmatic Data
	- Audit Reports
	- Budget Requests
	- Actuarial Data and Master File
	- Historical Reports and Data
	- GIS Floodplain Data and Maps
	- Marketing Materials
	  - Brochures
	  - Publications
	  - Videos
	  - Displays
	  - Advertising
	- Claims Data Bases
	- Underwriting Data Base
	- Insurance Transaction Data
	- TRRP Plan Statistical Transactions
	- Community Master File and Information
	- Condominium Inspector Data
	- Q3 FIRM Maps
	- Financial Statements
	- Policy Data
	- Claims Data
	- Financial Data and Master File
	- Repetitive Loss Data and Master File
	- Property Address Master File
	- Policy and Claims Detail Data
	- Policy Master File
	- Claims Master File
	- Submit for Rate Master File

FEMA Organization	Documents and Data Maintained

Operations Support Directorate	- Plans, Policies, & Procedures
	- Occupational Safety and Health Data
	- Agency Electronic Records
	- Agency Publications
	- Agency Logistics Readiness Data Bases
	- Personnel Security Information Data Bases
	- Facilities Security Data Bases
	- Budget Requests
	- Correspondence
	- Data Associated With:
	  - Transit Subsidy Program
	  - Federal Ride Sharing Program
	  - Committee Management Program
	  - Records Management Program
	- Facilities Engineering Drawings
	- National Security Data Bases

Information Technology Services Directorate	- Information Technology Architecture (ITA) - Plans, Policies, and Procedures - Budget Requests - Correspondence - Library of Information Technology (IT) Systems Documents - IT Configuration Management (CM) Data (includes Network CM) - Data Dictionary and Models - Help Desk Materials and Trouble Ticket Data Base - Interface Control Documents - Year 2000 Compliance Data - Information Resource Board (IRB) Documents - GPRA Reporting Data - Procurement Data - Capital Plans, Budgeting, and Investment Data - IT Reports - Radio Frequency Spectrum Management and Call Sign Data - TIMACS Data - On-line FEMA Telephone Directory - ITS Requirements Documents - IT Systems Test and Evaluation Reports - Engineering Studies and Analyses - Cryptographic Equipment Data - Electronic Key Management Data - IT Systems Software Library - Equipment Inventories - Security Architecture Data - Enterprise Security Management Data and Documents

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Appendix H FEMA IT Architectural Principles and Supporting Rationale

This appendix establishes the basic architectural principles upon which future FEMA IT systems will be designed, built, and acquired; and upon which legacy IT systems will be systematically re-engineered. The architectural principles provide the basic ground rules for building and re-engineering IT systems. They are intended to provide a stable foundation upon which FEMA developers, engineers, and integrators can make important IT systems design and implementation decisions. These principles can be expected to evolve as FEMA's mission and business functions evolve.

The architectural principles defined below are mandatory for compliance. Except as indicated, the principles apply to new systems and any new development, interfacing, re-engineering, re-hosting, or integration of legacy systems.

Architectural Principle	Rationale for Inclusion in FEMA ITA
To the maximum extent practicable, FEMA IT systems shall be designed, developed, implemented, interfaced, and integrated in accordance with internationally-accepted open systems standards as profiled and accepted in this *FEMA IT Architecture*. This principle shall apply to new systems as well as to any re-engineering, re-hosting, future integration or interfaces with legacy systems.	- Needed to ensure interoperability and cost effectiveness across the enterprise and throughout the life-cycle of the IT system.
The FEMA CIO has cognizance over all IT systems development projects. The FEMA CIO shall have the authority to challenge, review, re-direct, and/or or terminate any FEMA IT systems project that violates policies and the *FEMA IT Architecture*.	- Needed to maintain adequate controls in accordance with the *Information Technology Management Reform Act* and the *Government Performance and Results Act*.
Closed, proprietary approaches to IT systems shall be strongly proscribed against unless justified to the CIO and IRB for extraordinary circumstances including but not limited to cost-benefit factors and other pressing operational factors.	- Needed to ensure interoperability and cost effectiveness across the life-cycle of the IT system. - Provides an *escape* route, should no open systems approach be effective.
Industry standard approaches (as opposed to closed, proprietary approaches) are acceptable but must be fully documented and profiled to the satisfaction of the CIO and IRB to ensure long-term data usability and integrity.	- Allows for industry standard approaches as long as FEMA developers, engineers, and integrators aware of the requirements to be able to read and process the data/document should industry standard tools become scarce. - Responsive to directives of NARA and the *Federal Records Act*.

Architectural Principle	Rationale for Inclusion in FEMA ITA
The practice of declaring a particular IT tool, system, or application as a FEMA enterprise-wide standard is supported, but shall not be considered a routine, standard, or automatic occurrence. The declaration of a standard tool must consider other factors such as compliance of the tool, system, or application to open systems standards and/or industry standards. A critical factor is the potential archival longevity of FEMA corporate data maintained by the tool and the potential to migrate the data to a new system, tool, or application.	- Recognizes that standardizing on data is more important from an archival perspective than standardizing on a tool. - Recognizes that FEMA as well as other federal agencies have little control over defining functional capabilities of tools - Responsive to directives of NARA and the *Federal Records Act*.
All new IT systems and re-engineered systems shall be compliant with legal and regulatory documents and plans identified in Sections 1.3 and 1.5 (and associated appendices) of this *FEMA IT Architecture*. This shall be a checklist item for compliance in reviews.	- Required to maintain compliance with public law, directives, court cases, and high-level plans.
For a tool, application, or system to be declared a FEMA enterprise-wide standard, the proposing activity must prove to the satisfaction of the CIO and the IRB that the vendor or distributor is solvent and reliable. This does not relieve the proposing activity of the responsibility to demonstrate that the data maintained by the tool, application, or system is long-lived from an archival perspective and can be migrated.	- Considered necessary for the declaration of a tool, application, or system as a standard. - The CIO and FEMA IRB want to be sure that the declared standard has some measure of longevity and to properly consider whether the recommendation should be accepted. - Standard tools from vendors that are considered potentially insolvent or unreliable will be rejected.
IT systems shall be designed, implemented, and integrated in due consideration of the following requirements: security, interoperability, flexibility, affordability, scalability, portability, and extensibility. Detailed requirements will be promulgated and tailored by the CIO in collaboration with the IRB.	- Establishes the stated requirements as important architectural considerations for the design and development of IT systems.
IT systems shall be designed to be responsive to operational environmental factors for the business functions that they support. See Section 1.6.6 and Appendix J	- Recognizes the importance of operational environmental factors in the design of IT systems in support of business functions and raises the level of visibility of these factors to the CIO and the IRB.

Architectural Principle	Rationale for Inclusion in FEMA ITA
When fully developed and determined by the CIO in coordination with the IRB, IT systems shall conform to a FEMA enterprise-wide data dictionary and/or provide for alias mechanisms which preserve semantic and syntactic integrity.	- Recognizes the central importance of a universal data dictionary in achieving interoperability. - Provides for flexibility in interfacing with legacy systems.
In the development of FEMA IT systems, a strong preference shall be given to COTS implementations that implement open systems, standardized approaches; as opposed to a separate FEMA-sponsored development activity.	- Recognizes that COTS implementations are generally less costly than full-blown development efforts; and need to be strongly considered. - Provides for an *escape* mechanism if no COTS alternative is deemed effective.
In the design and development of IT systems, strong preference shall be given to approaches which implement the concept of creating data and information once in its most intelligent and searchable format, effectively managing it across its full life-cycle, and gaining maximum downstream re-use. Approaches that print or *dumb-down* data (to be later electronically re-captured) are strongly proscribed against and may be denied in systems review processes.	- Recognizes that approaches that squander information and intelligence in the data and documents are costly. - Recognizes that scanning, conversion, and OCR activities are time-consuming, costly, and can introduce errors that are difficult and expensive to identify and correct.
In establishing interfaces among IT systems, established IT architectural principles should not be compromised just to achieve an interface. Due consideration should be given to achieving interoperability using an open systems approach.	- Drives a requirement for future development activity especially for integration with legacy systems. - *Two wrongs don't make a right.* - Serves to move or drive towards interoperability in an open systems fashion.
Any proposed IT development activity shall consider the operational impact on existing FEMA networks and communications. By the same token, FEMA networks and telecommunications resources shall be responsive to operational requirements to provide appropriate levels of Quality of Service. The CIO in consultation with the IRB will be the adjudicating authority should conflicts arise.	- Recognizes the IT systems and network systems are inextricably linked and inseparable. - Provides a mechanism for FEMA organizational elements to propose higher bandwidth IT requirements or changes such as decentralization or establishment of VPNs and Extranets and places some of the burden of analysis on network operations personnel.

Architectural Principle	Rationale for Inclusion in FEMA ITA
Any proposed IT development activity shall consider the potential impact on FEMA's business partners (i.e., the enterprise) and to the maximum extent practicable shall secure appropriate endorsements, consensus, and support.	- Recognizes that IT systems are a central part of the FEMA enterprise and for interoperability and streamlined electronic information to flow that a consensus among affected business partners should be achieved.
Any proposed IT development activity shall re-use existing defined FEMA enterprise-wide IT architectural components unless the components can be demonstrated to be inadequate to the requirements to the satisfaction of the CIO and the IRB.	- Establishes a firm requirement for re-use of IT architectural components that can meet requirements. - Provides a mechanism for highlighting any deficiencies in the definition or implementation of common architectural components.
All IT systems development activities shall conform to one of the established *FEMA IT Architecture* life-cycle models (Spiral, Waterfall, and Pilot/Prototyping).	- Declares the requirement that IT systems be developed in a structured and disciplined manner in accordance with the ITMRA and the GPRA.
Strong consideration and preference will be given to IT systems life-cycle cost-benefit analyses especially in assessing the role of open systems standards. Life-cycle analyses may need to be conducted in addition to any cost-benefit analyses that might be developed as part of a particular IT system project phase.	- Recognizes that efficiencies and cost savings might only be achieved through proper life-cycle investment analyses. - Recognizes the central importance of standards in life-cycle investment decisions.
IT systems shall employ standardized and *FEMA IT Architecture*-compliant configuration management (CM) approaches.	- Establishes a firm requirement for configuration management and control in a standardized fashion.
All design decisions on IT systems shall consider the legal and regulatory impact and the potential that the data/information in the system might be used in a court of law or other legal proceeding. This shall include maintaining adequate audit trails to support legal proceedings to the satisfaction of the Office of General Counsel. In the future, this may include provision of digital signature and secure date-time stamping services.	- Recognizes that FEMA IT systems must operate in a legal and regulatory environment –particularly in light of recent court cases.

Architectural Principle	Rationale for Inclusion in FEMA ITA
In design and development of IT systems, strong encouragement and support is given to establishing partnerships and collaboration with external entities including businesses and FEMA partners. Strong encouragement and support is also granted to rapid prototyping activities and demonstrations.	- Recognizes and endorses the opportunity for FEMA IT systems developers and integrators to achieve savings and promote increased interoperability through partnership actions. - Helps set the stage for acceptance of rapid prototyping and piloting as viable methods to develop systems.
All FEMA IT Systems shall be Year 2000 compliant	- Required by law and recent directives.
Consistent with other IT architectural principles, strong preference shall be given to IT systems which maximize and exploit Internet- and Intranet- technologies and approaches.	- Recognizes the central role and direction of modern Internet technology as part of the National and Global Information Infrastructure. - Sets the stage for acceptance and profiling of Internet-based standards recommended by various Internet standards committees.
IT systems documentation standards shall be enforced.	- Establishes the requirement for discipline in the documentation of IT systems.
In the development of IT systems, developers and engineers shall demonstrate an awareness that electronic documents and paper documents are different media and are governed by different IT standards. The following principles pertain: 1. Consistent with the direction of the NII/GII, a valid FEMA electronic document can legally contain complex multimedia objects that might not be renderable on paper. Electronic media may be considered *pageless* and *paperless*. 2. Where electronic documents and paper documents must be synchronized, preservation of the information content on each of these media shall be considered the essential data integrity criterion and not necessarily the *look and feel* of the electronic document as it is printed to paper.	- Recognizes that paper-based and electronic documents are different media and establishes this notion as an important architectural principle. - Expected to facilitate future systems development in such areas as digital libraries, document management systems, and data warehouses. - Effectively removes the argument that the electronic copy and the paper-based copy must look the same and preserve page integrity to be determined to be identical. - Sets the stage for IT systems developers to manage electronic documents and data to maintain robust electronic data integrity.

Architectural Principle	Rationale for Inclusion in FEMA ITA
Mandatory policies and procedures in the *FIRMPD* and *IT Capital Planning and Investment Guide* are considered essential elements of *FEMA IT Architecture* and shall be considered a part of this document.	- Recognizes that these documents provide additional amplifying policy, procedures, and directives and incorporates them by reference into this higher level *IT Architecture* document.
Any architectural elements, components, standards, or criteria not explicitly reserved in the *FEMA IT Architecture* and supporting documents shall be the purview of the project office proposing the project	- Provides systems developers and engineers with the flexibility and authority to develop systems to meet requirements as long as stated architectural principles are not violated.

Appendix I Executive Directives, Congressional Acts, and Judicial Guidance Affecting the *FEMA IT Architecture*

This appendix identifies additional Executive Directives and Orders, public law, and judicial guidance that broadly impact the development of the *FEMA IT Architecture*. The reader is also referred to Appendix C , which identifies explicit references to FEMA and to comprehensive emergency management in such documents.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
Executive Directive for the National Performance Review (NPR)	The ***Executive Directive for the National Performance Review (NPR)*** requires federal agencies to re-engineer business processes to *operate better, and cost less*. It is this broad mandate which forms the underlying basis for the Vice President's *Access America* document and a number of agency information technology projects targeted on improving government services including new initiatives such as the Digital Government Initiative. The *Access America* document mentions an opportunity for FEMA to collaborate with the Data Management Working Group within the President's Office of Science and Technology Policy's (OSTP) Committee on Environmental and Natural Resources (CENR). For FEMA, the potential exists to have expanded access to geographically-oriented environmental data bases and improved search tools to support high-priority mitigation business functions. Additionally, with the *Access America* document, the opportunity exists for FEMA to collaborate with (and leverage) other federal agencies on universal Electronic Benefits Transfer (EBT) and Electronic Grants Management pilot projects as well as cooperative buying of high-bandwidth telecommunications services.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
Executive Directive for Electronic Commerce (EC)	Closely associated with the NPR is the ***Executive Directive for Electronic Commerce (EC)*** (October 26, 1993 at *Federal Register*, Vol. 58, No. 207, 58095) which established policy for streamlining procurements through electronic commerce means. Historically, electronic commerce has been somewhat limited in scope and mostly procurement oriented. However, more recently with the establishment of EC working groups in GSA, DOD, and the Department of Commerce, electronic commerce is rapidly evolving to also embrace standards for complex electronic document and data interchange (such as electronic grants management and specifications for products to be procured); legal and regulatory electronic filing including digital signature and secure date-time stamping; and greater use of the Internet (vice specialized Value-Added Networks). These aspects of electronic commerce have important implications for development of FEMA's *IT Architecture* and should be considered.
Government Performance and Results Act (GPRA)	The ***Government Performance and Results Act (GPRA)*** requires each agency to establish strategic plans and performance measures. Through a strategic planning process, FEMA's mission, goals and objectives, and strategies have been systematically defined to anticipate and adapt to expected change. In support of the GPRA, each program activity in FEMA's budget is being held accountable to established performance measures which support accomplishment of FEMA's mission. In an enterprise sense, FEMA is now also in the process of *pushing down* its requirements for GPRA reporting and accountability to FEMA's grantees. Information flow and data collection, data capture, and data analysis aspects of the GPRA are clear-cut drivers for development of an integrated *IT Architecture*.
Computer Security Act	The ***Computer Security Act*** provides security requirements and legal constraints in such areas as confidentiality, data integrity, assured service availability, fault tolerance, etc. Elements of security under the *Computer Security Act* have been considered in the development of the *FEMA IT Architecture*. See Section 2.4.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
Federal Records Act	The ***Federal Records Act*** is a collection of statutes intended to assure accurate and complete documentation of the policies and transactions of the Federal government, the control of the quantity and quality of records produced by the Federal government, and the judicious preservation and disposal of records. To the extent that FEMA records constitute official government records to be preserved by the National Archives and Record Administration (NARA), the requirements of the *Federal Records Act* must be factored in the development of the *FEMA IT Architecture*. FEMA recognizes that standards are an important component of the TRM, which is a part of the ITA according to OMB M-97-16. FEMA recognizes that these IT standards must be coordinated across multiple agencies to achieve interoperability and the long-term requirements of the *Federal Records Act*.
National Telecommunications Act	The ***National Telecommunications Act*** provides a framework for acceptable use, growth, future development, and tariffs for the nation's information network and telecommunications backbone. FEMA's mission critically depends on timely, robust, and secure high-bandwidth telecommunications and networking on a national and international scale. The provisions and strategic direction of the *National Telecommunications Act* have been considered in the development of the *FEMA IT Architecture*.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
Paperwork Reduction Act of 1995	The ***Paperwork Reduction Act of 1995*** directs federal agencies to establish processes that are sufficiently independent of program responsibilities, that they can fairly and objectively evaluate whether proposed collections of information are necessary for the performance of agency functions and should be approved by OMB. The objectives of the OMB review are: 1. To ensure that proposed collections of information have practical utility 2. Are the least burdensome to perform the agency's business functions 3. Comply with legal requirements and achieve program objectives 4. Do not duplicate information otherwise accessible to FEMA 5. Minimize the cost of collecting, processing, and using the information without shifting disproportionate costs or burdens to the public. Accordingly, the requirements of the *Paperwork Reduction Act* have clear-cut implications for defining information flow aspects of the *FEMA IT Architecture*.
High Performance Computing and Modernization Act of 1991	The ***High Performance Computing and Modernization Act of 1991*** established much of the existing high-performance computing and telecommunications backbone across the United States, and which in no small measure has built a robust infrastructure that has untapped potential to support FEMA's mission. Particularly significant is the opportunity to leverage: 1. Distributed digital library technology for managing petabytes (e.g., 1,000 terabytes) of GIS data for mitigation activities 2. Distributed interactive simulation (DIS) technology for more realistic exercise planning, reconstruction, and analysis 3. Virtual reality modeling technology to support realistic 3-D simulations and visualization for training purposes 4. Telepresence, telerobotics, and telemedicine technologies to support response and recovery mission functions. During the development of the *FEMA IT Architecture*, a number of strategic opportunities for leveraging the high-performance computing infrastructure were identified.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
Growing *corpus* of case law	FEMA is aware of a **growing *corpus* of case law** in which electronic documents, data, and records are being accorded *official* records status (e.g., *Public Citizen v. Carlin* and *Armstrong v. Executive Office of the President*). FEMA with its Office of General Counsel is also aware that the electronic documents and data (themselves) are increasingly being introduced and used in legal proceedings. The requirements for long-term archival storage and retrieval of documents and data for historical and legal purposes are still under active consideration at NARA. Vital issues include digital signature and secure date-time stamping and proving irrefutably in a court of law that electronic records have not been altered. This *IT Architecture* document is aware of that activity and is consistent with it to the maximum extent practicable. FEMA understands that this needs to be a continuing active area of consideration particularly for the development of the Technical Reference Model (TRM).
FIPS Standards, OMB Memoranda, NARA Directives, Industry Standards, NIST Technical Reference Model (TRM)	FEMA is also cognizant of a large number of related documents and directives including: **Federal Information Processing Standards (FIPS), Office of Management and Budget (OMB) Memoranda, National Archives and Records Administration (NARA) Directives, Industry Standards, and the National Institute of Standards and Technology (NIST) Technical Reference Model (TRM).** Together, these documents and directives: • Define requirements for implementing open systems standards and architectures in federal information systems • Provide technical requirements for electronic document and data interchange and reporting • Provide rules for public information dissemination and information access • Provide *fee for service* provisions which can lead to a *seat management* approach to provisioning IT resources at FEMA • Provide requirements and constraints for digital signature and encryption technology • Provide guidelines and requirements for acceptable use of networks and telecommunications resources.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
FEMA's own policies and rules governed by other public laws	Lastly, FEMA has its own **internal policies and rules which are governed by other public laws** and which impact on the development of an enterprise *IT Architecture*. Among others, these include the *Stafford Act* and the Code of Federal Regulations (44 CFR 1.1). Section 1.6.1 and Appendix C provide additional references to FEMA in other public law and federal regulations.

Appendix J Operational Environmental Factors Influencing FEMA IT Systems

This appendix identifies the major operational environmental factors that must be considered in the development of IT systems. As indicated in Section 1.6.6, these represent critical IT architectural factors. It should be clear and understood that not every FEMA business function is mission-critical and require a robust and redundant IT support capability under the worst of the operational environmental factors.

On a day to day basis, most of FEMA's business functions are well handled in a normal business office environment. However, the potential always exists that FEMA will need to respond to contingencies that are extraordinarily severe.

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
Adverse weather conditions	Adverse weather conditions include rain, snow, heat, bitter cold, drought, and flood conditions among others, which have caused an emergency somewhere within the country. The major IT architecture considerations include: - Potential need for portable rugged computers (mobile computing) capable of operating under extremes in weather. Any requirement for portable rugged computers would need to be traded off against the lower cost and higher availability of non-rugged commercially available laptops - Potential need to establish a DFO to work under such circumstances - Need to have messaging services and remote communications.
Local, state, and/or regional infrastructure potentially destroyed or inoperable with the need to operate in a transportable environment (such as a MERS/MATTS support to a DFO)	A number of contingencies and disasters may render a local, State, and/or Regional infrastructure potentially destroyed or inoperable. In these circumstances, FEMA must respond frequently with the establishment of a DFO (or set of DFOs) and work to restore basic infrastructure capabilities. In the interim, FEMA response and recovery assets must be self-sufficient including IT assets. In large measure, this operational environment factor places the most stress on IT systems. For this operational factor, the major IT architecture design, implementation, and integration considerations include: - Need to get adequate advance warning and alert (as technically and operationally feasible). This is matter of preparedness and IT systems and telecommunications must be in place in advance to provide the advanced warning and alert

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
	- Need an efficient and streamlined approach supported by IT systems and telecommunications to make timely and accurate damage assessments; to report results through local, State, and Federal sources; and to brief the President to request a Federal disaster declaration. In general, there is a need for IT systems to provide more interactivity, collaboration, real-time performance and remote visualization capabilities. From an IT technology perspective, this is frequently referred to as telepresence. Can decision makers be effectively *teleported* to the area? - Need to execute contingency plans utilizing IT systems as needed. This generally includes having tested the IT and network systems in realistic training exercises in advance of the contingency - Potential need for continuous uninterruptible power supplies for supporting IT systems, until local power can be restored - Need to establish voice, video, and data communications to all participants in the FRP quickly and efficiently - Need for IT systems and supporting personnel to be totally self-sufficient until the infrastructure is restored - Need to potentially coordinate infrastructure repairs especially for utilities (e.g., water, fuel, electric, communications, transportation), disaster victims, businesses, etc. - Need to develop a rapid and accurate as possible situation assessment and disseminate the assessment to concerned parties - Need to capture data and information quickly, efficiently, and as accurately as possible and provide it quickly to the FEMA enterprise participants - Potential need to support FEMA deployed field personnel through portable devices (radios, messaging services, GPS, etc.) - Need to disseminate information to affected individuals and coordinate the full spectrum of human support services utilizing IT systems and networks - Need for IT systems and networks to be flexible and extensible ranging from providing highly centralized national-level support down to local decentralized capabilities as required by the FCO. Also a need to maintain span of control over IT resources including configuration management of resources - Need for IT systems to be reliable, redundant, interoperable, transportable, flexible, and secure.

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
Need for operations in a remote or rural environment (perhaps requiring a DFO)	In general, FEMA needs to consider and plan for the complete scope of locations where disasters and emergencies can occur. The potential clearly exists for operations in a remote or rural environment such as a forest or wildfire area, remote islands and territories of the United States, agricultural areas, mountainous areas, forested areas, etc. In this environment, there may also be a need to preserve natural resources such as indigenous flora and fauna as well as historical and cultural sites. Compared to the urban environment, this environment is characterized as not having much of an infrastructure to start with. It is also characterized by low population density. In this environment, FEMA may set up a remote DFO. The major IT architecture design, implementation, and integration considerations include: - Need for transportability and portability of IT systems and associated telecommunications support - Need for IT systems to create, manage, and use environmental information and information on historical and cultural sites - Need for remote geo-sensing and distributed GIS applications - Need for FEMA field sources to be completely or nearly completely self-sufficient from an IT systems perspective including power sources - Need for wide-area telecommunications support where there is generally no existing infrastructure. Generally, this implies need for long-haul communications such as HF and/or satellite.
Need for operations in a large destroyed urban environment (example: earthquake) – other than at FEMA HQ or a Regional Office	FEMA emergency operations in a large destroyed urban environment (such as due to an earthquake) are essentially the opposite of operations in a remote and rural environment. This operational factor is similar to the operational factor for the situation where local, state, and regional infrastructure is destroyed but with a few additional important IT considerations which need to be addressed. Most notably, the sheer numbers of individuals that may be affected may place additional stress on IT systems from a scaleability perspective. On the other hand, if a significant portion of the urban power, communications, transportation, housing,

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
	health services, local government, and business infrastructure has survived; the potential exists that FEMA can use this remaining infrastructure to respond to the disaster. A chemical or biological attack might leave a physical infrastructure intact but with no personnel to support it. The major additional IT architecture design, implementation, and integration considerations include: - Need for IT systems to be scaleable to adapt to large numbers of affected persons in a human friendly manner - Need for rapid situation assessment in an urban environment - Need to develop effective plans for exploiting local existing infrastructure such as establishing automated information interfaces to the media, schools, businesses, shelters, government buildings, and utilities - Need to exploit indigenous IT and network technology resources that survive including cellular and wireless services; local media, telephone, and cable; and Internet to support mass information dissemination.
Virtual/synthetic environment (for training, exercises, and simulations)	This *FEMA IT Architecture* recommends establishing a comparatively new operational environment in which FEMA IT systems and network technology must potentially operate. This operational environment is termed a virtual or synthetic environment and can be used for training, exercises, and distributed interactive simulations. The major characteristic of this environment is that it needs to be as realistic as possible for training, exercise, and simulation purposes. An important ancillary benefit of developing IT systems that operate in this environment is that the capabilities can be readily re-used in real-world operational contingencies. In this virtual or synthetic environment, the major IT architecture design, implementation, and integration considerations include: - Need for distributed and uniform data bases and common models distributed among event participants - Need for a scenario generation capability including feeding data to the IT systems - Critical need for the real-world IT systems and networks to be designed, developed, implemented, and integrated up-front

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
	with a training or exercise mode of operation - Critical need to standardize and distribute data and metadata as well as models and IT tools - Need for provisioning an adequate volume of *realistic* data for training and simulation purposes - Need for preserving document and data integrity across the simulation - Need to support automated data capture for reconstruction and analysis purposes - Generally a need for higher bandwidth telecommunications to maintain control of the simulation or exercise - Need for distributed intelligent collaboration and visualization to support planning, operations, and reconstruction and analysis of the training, simulation, or exercise event - Need to seamlessly integrate the virtual and synthetic environment with IT systems designed for real world operations to support the notion of *practicing and training as though it were real* - Need to provide search and retrieval access to enterprise-wide documents and data bases through digital library technology - Need to establish automated standardized electronic interfaces with Regions, states, local government, and FEMA partners who want to participate in the exercise.
Contingency operations and alternate facilities	FEMA has the capability to conduct contingency operations at several alternate facilities. These facilities can be used in disaster and emergency operations to provide a critical support function for the Agency if operations are interrupted for any reason at FEMA Headquarters in Washington, DC. In this environment, the major IT architecture design, implementation, and integration considerations include: • A need for design, development, implementation, and integration of redundant, adaptable, and fault tolerant IT systems that are ready to assume operational control in a timely and efficient manner • Need for complete and total backup and replication of data from IT systems • Critical need for security and data integrity including synchronization of data • A need to train and exercise this contingency capability.

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
Office environment (e.g., FEMA HQ and Regional Offices including NFIP Regional Offices; and Emmitsburg)	The normal operational environment in which FEMA IT systems must operate is the day-to-day office environment at FEMA HQ, the 10 Regional Offices, the NFIP Regional Offices, Emmitsburg, and other offices. While the operational environment may be quiescent, the operational impact as well as opportunities for improved IT systems engineering is significant. Most FEMA business is currently transacted in an office environment, and the potential exists for additional streamlining through better integration of IT and network resources. Additionally, most IT systems development, engineering, and integration is currently performed in an office environment, and there is a real need to improve this capability. In the office environment, the major IT architecture design, implementation, and integration considerations include: - Need for discipline in adherence to IT policies and procedures - Need for tighter integration of enterprise systems such as NEMIS, IFMIS, LIMS II, FACMAN, OHRM corporate data base, NFIP data bases, etc. - Need to critically look at the large number of IT systems across FEMA and identify which are candidates for retirement, consolidation, and/or further development and refinement - Need for business process re-engineering for improved efficiencies - Need for planning, test, and evaluation of COOP responsibilities for critical business functions - Need for improved standardization of enterprise-wide configuration management practices - Need to establish and enforce an enterprise-wide IT data dictionary and enterprise-wide systems engineering standards - Need to implement appropriate security architecture provisions in such areas as access controls, digital signature, secure date-time stamping, audit trails, monitoring, etc. - Need to implement open systems document and data standards to address long-term archival storage requirements - Need to recognize the legal and regulatory impact of decisions regarding electronic records. Electronic records are increasingly being introduced in a court of law and most of the records are being generated and produced in common office environments

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems

	- Need for increased enterprise-wide standardization and adherence to established architectural components such as:
	  · Enterprise-wide correspondence and action tracking system
	  · Enterprise-wide document management system
	  · Enterprise-wide text search capability
	  · Enterprise-wide approach to digital library technology
	  · Enterprise-wide approach to use of groupware or distributed collaboration and visualization tools.
	- Need for more enterprise-wide exploitation and integration of FEMA Geographic Information Systems (GIS)
	- Need to achieve consensus on standards for more structured document and data interchange with FEMA business partners
	- Need for better utilization of office automation tools including enterprise-wide adoption of a more viable e-mail system
	- Increased need to collaborate with other federal agencies to address IT problems of mutual concern and interest.

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Appendix K Cross-Cutting Issues Associated with Development of the Technical Reference Model and Standards Profile

This appendix summarizes the key standards-related issues associated with the creation, management, and use of electronic documents and data sets across the emergency management community. Some of these issues are still unsettled across the IT community, the National Archives and Records Administration (NARA), and the courts.

These are issues that affect multiple Federal agencies and should be addressed in a coordinated fashion across the Federal government.

1. **Longevity of File Formats and Archival Storage Requirements.** For FEMA, an important issue associated with electronic documents and data sets is the longevity of the file formats and the long-term archival storage and retrieval requirements of the emergency management community and the public. This issue is closely related to the concern regarding internationally-accepted open systems standards for document and data interchange as opposed to acceptance of industry-standard or proprietary approaches. Specifically, FEMA is concerned about the anticipated lifetime of the particular file format within FEMA's IT systems. In general, any migration of data including translation risks loss of document and data integrity. FEMA is also concerned with the long-term availability of software/viewers to render the files to support information dissemination activities as well as perhaps downstream legal proceedings.

   In an open systems environment, the issue of longevity can (in principle) be addressed by formally and rigorously defining the allowable file and data formats. As indicated in OMB M-97-16, it is necessary to develop formal Standards Profiles (e.g., Application Portability Profiles (APPs)). Standards profiles are the detailed set of rules, guidelines, implementation conventions, data elements and entities which fully define the allowable file formats for graphics, text, and other complex objects (e.g., math and chemical expressions, multimedia, etc.) For any community, such as the emergency management community, the profile then provides the formal rules for tailoring and/or using a given information interchange standard to enhance portability and interoperability of the file. This activity is essentially a time-consuming, consensus-building (as well as frequently, educational) process. For this approach to work, it must cut across multiple Federal agencies (each of which have their own constituents), FEMA's business partners in industry, voluntary organizations, as well as FEMA's customers: the States and local governments. Achieving this level of consensus is problematic.

   FEMA understands that documentation of the electronic file and data formats is required by NARA to support long-term archival storage and retrieval requirements of the federal government. FEMA also appreciates that by having a formal and standardized definition of the file and data formats, as technology changes and evolves, it should be possible to develop new software/viewers to read and render the archival documents and data in the future; thereby mitigating any need for translation.

However, there are no guarantees that consensus can be achieved across the broad and diverse enterprise.

2. ***Subsets vs. Supersets* and the Availability of Well-Defined APPs/Standards and Viewers/Tools.** Closely related to the issue of *longevity of file formats and archival storage requirements* is an important architectural issue associated with potential *subsets* and *supersets* of the data file formats. An ancillary concern is the availability of (and commercial viability of) viewers and tools to create, manage, and use the files. This issue is one of the more complex issues associated with maintaining data integrity while interchanging electronic documents and data across an enterprise.

   Most of the current file and data formats for graphics and complex objects support *subset* implementations, where perhaps not all of the features of the file format may be incorporated in a commercial product. By the same token, vendors are also normally free to develop and integrate *superset* features in their products, which may or may not be well documented as part of the file definition. The current concern about HTML and Web browsers and their lack of interoperability is an excellent example of this problem. *The real problem for interoperability occurs when there is a mismatch between the capabilities of the tool(s) used by the sender of the file and the tool(s) used by the receiver of the file – resulting in files/data that can not be read or rendered at all.*

   Within the scope of the *FEMA IT Architecture*, one way for FEMA to address this problem is by potentially identifying a set of standard tools to be used across the enterprise. The difficulty on achieving consensus across the enterprise on standards and standard tools is discussed above. Across the broad and diverse emergency management community, there is currently little consensus on standard tools.

3. **Potential for Misuse of Standard Tools.** FEMA recognizes that even with a designated standard tool, there is a significant potential for misuse of the tool within the scope of the *IT Architecture*. For example, many commercial products support *Save As…* functions or configuration *Options…* which can *flavor* the file which is produced and/or incorporate features which may not be formally defined. Another problem is that one standard tool may depend upon another. For example, using a standard word processor may also require standardization on printers and print drivers so that the sender and receiver can print out pages, which look identical. Then again, the versions of the tools (and print drivers) may need to be the same. Achieving consensus and standardization across the enterprise at that level of detail is extraordinarily difficult.

   FEMA is also concerned that many COTS products, which are potential candidates for designation as a standard tool can also display and handle more features than might be formally defined in a Standards Profile. In other words, they support *supersets* of the formal file definition. The potential risks are that an electronic file may be produced with extra *features* or *entities* which can: 1) not be accurately rendered in otherwise compatible tools used by enterprise, or 2) lie outside the formal

file definition in the standard profile. The latter problem is perhaps worse from a downstream archival storage perspective. An archival storage issue or a legal issue which may arise several years from now is: "What are the undocumented features and entities in this archival file?; What do they mean?; and How where they used from an agency business perspective at the time the file was created?"

FEMA appreciates that this concern is far from being resolved and is a major issue for NARA. This issue is a cross-cutting issue, which impacts multiple Federal agencies, their partners, and their customers.

4. **Handling of Metadata, Hidden Text, Macros, Executables, and/or Attributes**. In an electronic document and data environment, it is important to recognize that many file and data formats support concepts such as embedded metadata, hidden text, macros, executables (such as Java code), or data element attributes, which are not normally viewable at the time that the file is rendered for viewing. Thus, it is possible for the electronic files to have either embedded and/or hidden information or data, which may or may not be substantive, raising potential rules and legal issues. This concern was voiced in the *Public Citizen v Carlin* ruling, and was cited by the court as an important reason for Federal agencies to effectively manage their electronic documents, data, and archives – as opposed to just printing them out on paper. Once again, this issue is an important cross-cutting issue for multiple federal agencies. It is far from being solved and needs to be addressed by NARA and OMB.

5. **Presentation Issues and Document Fidelity - *Pageless vs. Page-Oriented* Displays**. In transitioning from a paper-based emergency management environment to more electronic environment, presentation issues and document fidelity and integrity are potential issues, which need to be addressed as part of the IT architecture. For example, must a request for a disaster declaration from a Governor look exactly like the original? Is the written signature important or can a digital signature (supported by a secure digital certificate services environment) suffice? Then, what are the concerns that a raster-scanned copy of a written signature can be easily forged or the signed and digitally-imaged document easily altered?

   FEMA is concerned that to maintain page integrity and a *What You See Is What You Get (WYSIWYG)* presentation, it is generally necessary to embed fonts and style elements (such as kerning, line spacing, margins, etc.) into the electronic files; or settle for a facsimile. Unfortunately, font and stylistic elements within electronic documents such as commercial word processing files are mostly proprietary (i.e., they are not open), and facsimile documents are not searchable. An ancillary concern is the problem that different printers and different print drivers may also print the document and its embedded graphics differently.

   One way to mitigate against this problem is to utilize an intrinsically *pageless* approach to electronic documents, which obviates the need for maintaining constant document presentation and page integrity. This approach is consistent with the direction of the National and Global Information Infrastructure Initiatives (NII/GII)

and the use of SGML and more recently Extensible Markup Language (XML) which is expected to replace HTML on the Web. However, getting consensus on this approach across the enterprise is difficult, especially with the legal community. The legal community generally wants to preserve the look and feel of a document. Again, this issue is a problem that impacts multiple Federal agencies. It needs to be addressed in a coordinated manner.

6. **Presentation Issues Associated with Multimedia Objects and Complex Objects**. Within FEMA and other Federal agencies, there is increased momentum towards multimedia applications. Within a future electronic document and data environment, there are a number of architectural concerns and issues about the presentation of multimedia objects (audio-video) and complex objects (such as mathematical and chemical expressions). FEMA can readily envision a scenario where these multimedia and complex objects can become official records of a disaster; and therefore, must be preserved under the *Federal Records Act*. This issue is a problem that impacts multiple federal agencies and their respective missions.

   FEMA's major IT architectural concern is that file types such as MPEG files, MIDI files, AVI files, and VRML files may require special hardware such as a 3D graphics accelerator boards or sound boards to properly render the file. Furthermore, the actual multimedia presentation may depend on the processing power of the CPU, the actual hardware, the bandwidth of the transmission network, or be operating system specific. Differences in playback quality between hardware- and software-based approaches to the presentation of multimedia objects need to be addressed for potential significance across the federal government, as a whole. Additionally, this issue has profound implications for long term archival storage and retrieval as addressed in issue number 1 above.

   At the current time, there is no simple solution to validation and long-term archival storage and retrieval of multimedia files. This cross-cutting issue needs to be addressed in a coordinated manner across multiple Federal agencies.

7. **Issues Associated with Duplicate Electronic and Paper Documents.** In the IT architectures of most Federal agencies, it is generally possible to print out the document and data files on demand, the obvious exception being embedded multimedia objects.

   This situation raises potential concerns, such as: "Which copy is the *official* copy?" and, "What is the best approach to keep the paper-based copy in sync with the electronic copy particularly if the document is dynamically changed throughout the Agency's business processes?". This situation is a cross-cutting issue for multiple Federal agencies, and additional policies and guidelines need to be provided.

8. **Selection of *Intelligent vs. Non-Intelligent* File Formats**. Lastly, FEMA appreciates that it is important to recognize that not all electronic file formats for text and graphics are equally as *intelligent* and useful. Some file formats are more *intelligent*

in that they can directly support indexing and searching of content within the document. Additionally, some of the file formats can directly support automated workflow processes at the embedded object level within the document. In general, these types of file formats are preferred. However, the real difficulty with this problem is achieving consensus across the enterprise. It is a significant problem for multiple Federal agencies, and especially for integration with legacy systems. Legacy systems may not support creation, management, and use of more *intelligent* document and data definitions without significant re-engineering.

As the *FEMA IT Architecture* evolves and technology improves, FEMA anticipates providing additional guidelines on which file types are preferred and applicable to certain document and data types applicable to the emergency management community. In general, the long-term direction and architectural preference will be towards open systems file types that are *intelligent* and searchable. FEMA understands this to be a consensus-building process.

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Appendix L Major IT Needs and Requirements of FEMA Organizational Elements

Section 1.12.2 addressed FEMA's major business functions of mitigation, preparedness, and response and recovery. These business functions are effectively assigned to the Mitigation Directorate; Preparedness, Training, and Exercises Directorate; and the Response and Recovery Directorate. As noted in Section 1.12.2, these business functions are also supported by FEMA's 10 Regional Offices.

In developing this *IT Architecture*, the ITS Directorate also interviewed other FEMA organizational elements (including the Regional Offices) to identify current and emerging needs for IT systems to support their assigned business functions.

This appendix lists the major IT systems needs and requirements that were identified during the structured interview process and provides amplifying information appropriate to Section 1.12.2.

Federal Insurance Administration

- Improved monitoring and compliance program for lenders in coordination with Federal regulatory agencies (e.g., FREDDIE MAC and FANNIE MAE)
- Improved capability to support mass mailings and dissemination of marketing materials
- Restructured relationships with Write Your Own insurance companies supported by IT systems and networks to include improved information dissemination
- Establishment of a contractor-operated Telephone Response Center with appropriate data base access as the central point of contact between the public and the NFIP
- Implementation of a reliable correspondence tracking system
- Improved utilization of GIS products across the FEMA flood insurance community. Increased integration of intelligent electronic formats for maps with claims and underwriting data bases; and for tracking policies where losses have occurred (especially repetitive losses)
- Improved ability to provide claims data to DFOs and Regions in standard format
- Enhanced marketing initiatives supported by IT systems to increase the number of policies
- Closer coordination with Mitigation Directorate on plans and policies for use of GIS products
- Improved use of technology in such areas as bridging heterogeneous data bases, digital libraries, data warehousing, data mining, document management systems, electronic commerce and funds transfer, digital

	signatures, Internet information and dissemination, distributed collaboration and visualization, economic modeling and statistical tools, and on-line analytical processing.
Operations Support Directorate	• Upgrade of LIMS to LIMS 2000 functionality and capability • Tighter integration and definition of interfaces of LIMS with OHRM corporate data base, IFMIS, and NEMIS • Increased consideration be given to IT systems implications for creation, management, and use of official agency electronic records per NARA guidelines; support for digital signatures and improved document and data integrity; and resolution of legal and regulatory issues and standards • Enterprise rollout of print on-demand capability using DocuTech and DocuColor.
Office of Policy and Regional Operations	• Improved capability to support environmental management reviews across the enterprise using GIS and other IT systems • Closer tying of the grants management process with the reporting of outcome-based results consistent with GPRA • Establishing the need for performance-based results and reporting as part of Performance Partnership Agreements (PPAs) with the States • Tighter integration of environmental factors (such as endangered species, endangered habitats, and historical and cultural artifacts) with FEMA's GIS products • Improved communications and document and data interchange with EPA, U.S Fish and Wildlife Service, and other agencies to provide GIS information of environmental significance • Consideration of need to provided improved connectivity of the Regions to State and local governments via Extranets and Virtual Private Networks • Implementation of an enterprise-wide correspondence, issues, and action tracking system.
Office of Financial Management	• Tighter integration, allocation of functions, and definition of interfaces across IFMIS and NEMIS – including improved programmatic documentation. Additionally, tighter integration, allocation of functions, and definition of interfaces across IFMIS and other related financial systems (e.g., Travel Manager and PROTRAC) • Implementation of Electronic Commerce and EDI as a matter of priority for appropriate FEMA business functions (cited as highest priority)

	• Development of, and implementation of, adequate financial methodologies for specifying, projecting, tracking, and controlling costs for telecommunications and networking; potentially including specification and costing of advanced telecommunications services such as ATM (with bandwidth on-demand and Quality of Service) • Improved use of technology in such areas as bridging heterogeneous data bases, economic modeling and statistical tools, digital libraries, data warehousing, data mining, document management systems, electronic commerce and electronic funds transfer, digital signatures, Internet information dissemination, distributed collaboration and visualization, and on-line analytical processing.
Office of Inspector General	• Establishment of a digital library of laws, regulations, rules, and state agreements • Improved use of electronic forms and standard work packages • Implementation of an enterprise-wide calendar and scheduling tool • Implementation of an enterprise-wide approach for digital signature and digital signature certificate services for legal evidentiary purposes and to maintain document and data integrity • Improved ability to conduct audits and investigations in the field; with auditors and/or investigators having remote access to corporate data via laptops and networks (including PCS services) while in the field • Access to FEMA GIS data and maps to support audits, investigations, and inspections • Standardization of enterprise-wide data dictionary across IT systems • Establishment of accepted enterprise-wide configuration management practices • Improved use of technology in such areas as bridging heterogeneous data bases, digital libraries, data warehousing, data mining, document management systems, electronic commerce and funds transfer, digital signatures, workflow, Internet information and dissemination, distributed collaboration and visualization, economic modeling and statistical tools, and on-line analytical processing.
Office of Equal Rights	• Currently maintain a complaints data base which is not *user-friendly*; desire a re-engineered capability with more usable and better structured tables • Need to develop an automated approach and methodology to handle Alternative Dispute Resolution cases • Potential candidate for electronic document submission and electronic filing of data to EEOC in standardized open systems formats with digital signature; will need to achieve consensus on standards and EEOC concurrence (considered somewhat problematic)

- On IT systems development efforts, desire a more formal review of human factors aspects of IT systems design to ensure systems compliance with public law such as the *Americans with Disabilities Act (ADA)*. Examples of such human factors design considerations include graphics user interfaces, speech recognition devices, and physical workstation configurations
- Need to develop a civil rights data base to support annual reporting; all data is currently on paper in this area
- Desire improved capability to capture data on electronic forms and scan and convert data provided on paper forms to an intelligent electronic format (such as tagged and indexed text and numerical data fields).

Office of National Security Affairs

- Must place special emphasis on secure systems and communications
- In general, IT needs are similar to other offices with major requirement for *NSA-level* security vice just normal *business-sensitive* security
- Desire access to FEMA enterprise-wide GIS resources and data with appropriate *air gap* for security purposes – would need to be imported into system
- Implementation of Electronic Key Management System
- Potential technologies of interest in a secure environment include: bridging heterogeneous data bases (e.g., for intelligence support), data mining (possible counter-terrorism identification), digital libraries, electronic mailroom (for routing and alertment of messages), integrated voice video and data applications with NSA-level security, and distance learning and training (to extent business partners would also participate)
- Significant need for secure group distributed collaboration and visualization
- On-line analytical processing (OLAP) tools and techniques (secure)
- Development of secure remote access capabilities.

United States Fire Administration

- Improved connectivity and networking to customers such as fire departments for access to National Fire Incident Reporting System (NFIRS) data, information dissemination, emergency response and support in the field, training and distance learning, and distributed simulations
- Willing to participate in pilot projects to implement new IT architectural components in conjunction with selected customers (e.g., fire departments and industry organizations)
- Improved search and retrieval of technical documents across the enterprise

- Improved use of GIS systems for fire-fighting and fire suppression as well as mitigation activities
- Improved use of technology in such areas as bridging heterogeneous data bases, digital libraries, data warehousing, electronic commerce and funds transfer, digital signatures, Internet information and dissemination, distributed collaboration and visualization, distributed interactive simulation, and virtual reality.

Information Technology Services Directorate

- Establishment of a well-defined, enterprise-wide, and standardized IT systems architecture using open systems standards in an appropriate manner
- Smooth enterprise-wide rollout of NEMIS and firm identification of NEMIS Version 2 baseline requirements (e.g., enterprise-wide grants management functionality)
- Tighter integration, allocation of functions, and definition of interfaces across enterprise-wide IT systems (e.g., NEMIS, IFMIS, LIMS, OHRM data bases, GIS, and FACMAN)
- Improved methods for escalating IT systems trouble reports to engineering
- Implementation of an enterprise-wide configuration management system covering hardware, software, data and metadata, documents, networks, etc.
- Establishment of an enterprise-wide and standardized data dictionary
- Development of enterprise-wide, standard IT systems engineering methodology potentially incorporating Software Engineering Institute (SEI) guidelines and criteria
- Improved methods of technology insertion, technology management, and evaluation in IT systems and networks
- More clearly defined policies and procedures for designing, developing, implementing, and integrating IT systems
- Improved GPRA reporting for IT systems
- Implementation of a better enterprise-wide e-mail system
- Establishment of enterprise-wide common IT standards and services such as a document management system, text search services, calendar, and correspondence and action tracking system
- Need to determine and evaluate impact of any emerging IT requirements and technology on FEMA enterprise networks (e.g., connectivity, security, bandwidth).

Regional Offices

- All Regions are willing to participate in pilot projects to implement new IT architectural components in conjunction with selected customers (States and local governments)
- Desire better hands-on training and familiarization with NEMIS including involving the States; also better identification of required hardware/software and IT infrastructure needs by the States
- Substantially better access to GIS data bases in an interactive manner.
- Improved access to personnel data bases (including tracking personnel resources) in disaster response scenarios
- Improved high-speed connectivity and automated document and data exchange with States and local governments (under the Community Assistance Program) (e.g., Extranets and Virtual Private Networks)
- Proponents for exploiting National Information Infrastructure (NII) capabilities in regions for disaster response (e.g., increased use of cable modems, Internet access in schools and public buildings)
- Proponents for improved collaboration and visualization capabilities; and use of digital video and digital photography
- Improved methods to support environmental and historical reviews for grant management and operations
- Implementation of more standardized approaches for exercise planning, reporting, and analysis in the Regions
- Increased utilization of wireless technologies for remote field operations
- Establishment of open systems standards and IT architecture for increased interoperability
- Ability to scan and convert legacy documents including faxes and manage within a digital library (with text search, document management system)
- In general, desire a decreased reliance on paper and more electronic methods with support for legal and regulatory records.

Office of Congressional and Legislative Affairs

- Need assured and consistent methods and procedures to identify, capture, flag, track, and monitor all correspondence and interactions with Congress at the Regional and HQ levels
- Implementation of an enterprise-wide correspondence and action tracking system with ability to search Congressional interest documents
- Desire ability to provide e-mail with attachments to Members – recognize that this is bigger issue than just FEMA; standards needed, problematic
- Need reliable archiving of e-mail, documents, office automation products, graphics, records, and data to meet legal and regulatory requirements

- Improved access to enterprise-wide solution for desktop faxing (security considerations permitting)
- Potential interest in a Extranet or Virtual Private Network to the Hill and maybe the Library of Congress to support intelligent collaboration and visualization activities and VTC with Congress and/or Executive Offices
- Desire implementation of a *push-based* approach to get update information on bills and legislation and then maintain this information in a data base
- Desire a data base linking Member information to *Project Impact* data base as well as alerting mechanism whenever a letter or correspondence is being sent from Mitigation that might have Congressional interest.

Office of Human Resources Management

- Wider dissemination of data and access across the FEMA enterprise to OHRM corporate data bases and tighter integration with NEMIS and IFMIS (with appropriate privacy and security provisions)
- Expressed a potential need for more direct connectivity to the Department of Labor for workman's compensation
- Tighter integration and connectivity to the Office of Equal Rights and Office of Financial Management
- Need to have more direct connections and information exchange with temporary DFOs
- Improved capability for video teleconferencing to support employee orientation; prefer a PC-based desktop approach
- Implementation of an employee call center with a library of answers and providing for different tiers of escalation
- Better ability to provide HR information to management including support for *ad hoc* queries and natural language queries
- Implementation of a 24/7 ability of employees to call in and make allowable changes to employee data profiles
- Firm establishment of guidelines and directives for electronic records as official agency records in lieu of paper records with support for digital signature and secure digital notaries (e.g., date-time stamping)
- Improved capability for automated Time and Attendance Reporting
- Implementation of an enterprise-wide correspondence and action tracking system.

Office of General Counsel

- Implementation of a better enterprise-wide e-mail system
- Improved ability to manage electronic document and data files to meet legal and regulatory requirements; proponent for standardized document and data formats; encourage NARA to clarify and resolve issues on archiving standards for long-term records management and office automation products
- Interest in electronic filing of legal briefs to Department of Justice and the courts as authorized
- Proponent for digital signature – must be simple, workable, and supported
- Need to assure that IT systems can meet long-term data integrity requirements and records management requirements through secure date-time stamping (i.e., digital notary and digital signature) to prove in a court of law that documents and data have not been altered (Example cited: debt collection letters and documents)
- Need to develop and implement a methodology for Alternative Disputes Resolution – improved VTC could help; would need to share documents and data and get them signed; might have to record the VTC session
- Improved use of technology in such areas as digital libraries, enterprise-wide document management system, legacy data capture and optical character recognition, text search and retrieval, correspondence and action tracking, video teleconferencing, electronic commerce, electronic filing, long-term electronic records management, and office automation products.

Office of Emergency Information and Media Affairs

- Improved methods for allowing disaster operations personnel to update information bases for public information dissemination and media affairs
- Improved ability to sift through publications, reports, newspapers, magazines, and documents to clip articles and abstract them for senior managers
- Improved coordination with the Emergency Management Institute especially regarding utilization of streaming audio and video
- Better ability to scan, convert, and index legacy paper documents and retrieve via text search tools
- Increased enterprise-wide standardization of electronic document and data formats (e.g., text, graphics, multimedia).
- Proponent for enterprise-wide use of SGML and especially Extensible Markup Language (XML)
- Increased utilization of Internet LISTSERV technology for information dissemination to lists of subscribers

- Better ability to create, manage, and use official agency records
- Increased exploitation of Internet and Active Desktop *push* technology
- Increased bandwidth to the Internet to support multimedia (e.g., RealAudio and PointCast) to many more simultaneous subscribers
- Improved cataloging, indexing, and handling of digital images/photographs
- Capability for increased public access to, and use of, FEMA GIS products on the Internet.

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Appendix M Catalog of FEMA Enterprise-Wide Systems

This appendix amplifies Section 1.12.4 and provides a more-detailed description of major enterprise-wide applications. It discusses the major business functions the application supports, and the standard tools the application uses.

National Emergency Management Information System (NEMIS)

NEMIS is an integrated system to provide FEMA, the States, and certain other Federal agencies with automation to perform disaster and non-disaster operations. NEMIS requirements support all phases of emergency management, from State mitigation planning to situation assessments, providing disaster assistance, command and control, programmatic planning, emergency support, and mitigation operations. NEMIS provides users at all Region, Headquarters, State, and Disaster Field Office (DFO) locations with standard processes to support emergency management wherever a disaster occurs. It supports information resources that enable FEMA to integrate preparedness, situation assessment, Preliminary Damage Assessment (PDA), and information and planning operations with FEMA programs and disaster assistance. This enables rapid and coordinated transition from monitoring an incident to managing declarations, setting up DFOs, and providing assistance to communities and individuals affected by a disaster.

NEMIS was conceptualized as a result of FEMA's recognition that the current information systems infrastructure is not providing enterprise-wide information and processing support necessary to respond to disasters in an efficient and effective manner. Lack of critical cross-organizational information is affecting FEMA's ability to provide quick and effective assistance. In particular, NEMIS is rectifying the following deficiencies of the current automated environment:

- The Automated Disaster Assistance Management System (ADAMS), FEMA's primary automated information system, utilizes outdated technology in a DOS environment. This application is not scalable to support several disasters, including a catastrophic disaster simultaneously, and requires a great deal of customized modification to support new disasters and to accommodate disaster-unique circumstances.
- Within ADAMS, data is maintained separately for each disaster. As a result, cross-disaster reporting can only be conducted using manual data gathering, analysis, and report generation, requiring a great deal of technical resources. The Disaster Automated Reporting and Information System (DARIS) is used for reporting, but it is a standalone system that requires re-entering data to generate the reports.
- Non-disaster operations, Preliminary Damage Assessments (PDAs), and many aspects of disaster support do not have adequate automated support which require manual processes or standalone, *ad hoc* systems and a large amount of human intervention.
- Data captured manually or in standalone systems (stovepipe systems) cannot be shared easily among programs, Regions, States, or other agencies which results in a duplication of effort within FEMA and with external agencies.

- Within the current *FEMA IT Architecture*, standalone systems for various functions utilize different technologies, environments, system management, and hardware. The array of different systems is confusing to non-technical personnel who must learn different user interfaces and commands and must determine which system is most appropriate for the task at hand. Supporting different environments also results in higher maintenance costs and lower compatibility between sites and disasters.
- Coordination with the States for each disaster can be problematic, since FEMA must establish a different interface for each new disaster and individually determine manual transmittal procedures.
- Current automated processing is not flexible enough to support disaster-specific circumstances. Disaster-specific rules must be custom developed for each new disaster.

NEMIS is a FEMA-wide system of hardware, software, telecommunications, and applications that provides a new technology base to FEMA and its partners to carry out the emergency management mission. Accordingly, NEMIS is an architectural cornerstone of the *FEMA IT Architecture*. NEMIS integrates and automates tools to support operations for:

- Human Services (HS)
- Infrastructure Support (IS)
- Mitigation (MT)
- Emergency Coordination (EC)
- Emergency Support (ES).

As an architectural *cornerstone* for FEMA IT systems, NEMIS has expandability and hooks to include other FEMA operations as desired.

NEMIS enables FEMA to use information as a strategic resource to provide effective and timely response, recovery, mitigation, and services. NEMIS provides managers with access to the data and analytical tools necessary for making effective plans and decisions. In addition to providing automated support for a full range of integrated emergency management processes, the NEMIS development project is a comprehensive effort to interface with other systems such as:

- **Enterprise-wide systems**
  - Integrated Financial Management Information System (IFMIS)
  - FEMA Enterprise Geographic Information System (GIS)
  - Logistics data bases (e.g., LIMS - the Logistics Information Management System)
  - Office of Human Resources Management (OHRM) Corporate Data Base
  - Facilities Management (FACMAN) System.

- **Other systems and data bases**
  - National Flood Insurance Program (NFIP) data base
  - Preparedness, Training, and Exercises (PT&E) systems

- National Emergency Coordination Center (NECC)
- Mobile Operating Centers
- National Fire Incident Reporting System (NFIRS)
- Internal Revenue Service
- Small Business Administration (SBA).

NEMIS provides a system that is easier to learn, use, maintain, upgrade, and expand. NEMIS uses a standard architecture with common data formats, standard system interfaces, and a common look and feel. NEMIS is an integrated agency-wide system that will evolve over time to meet multiple program requirements and management information needs. The FEMA ITS Directorate intends to apply these lessons learned in development and integration of other enterprise-wide systems and program-centric systems. With respect to the enterprise-wide *FEMA IT Architecture*, NEMIS integrates new technologies and capabilities with existing FEMA investments, including:

- Enterprise data base that provides access to authorized users throughout FEMA and State emergency management agencies
- Distributed system architecture that takes full advantage of the FEMA Switched Network (FSN) and future network architecture
- Data warehouse to support decision-making and provide an executive reporting system
- Online reference library to improve communication and dissemination within the agency
- Geographic Information System (GIS) capability for conducting analysis and producing geographic products
- Imaging storage and retrieval system for electronically storing correspondence, individual verification information, and Disaster Survey Report (DSR) supporting documentation
- Workflow management for tracking applications, documents, Congressional inquiries, and financial actions
- Electronic signatures to streamline financial controls (under consideration until digital signature becomes more universally accepted, affordable, and manageable)
- Interactive Voice Response (IVR) system to enable customer service representatives to answer applicant inquiries efficiently.

The NEMIS enterprise data base is a collection of subject area data bases that are linked together to permit the comprehensive retrieval of information across the entire enterprise. Common data formats and naming conventions allow existing and future applications to share and exchange data. NEMIS enables applications to share and exchange data as they have been unable to do in the past. Information exchange among programs and organizational elements will facilitate coordinated FEMA/State emergency management.

In addition, NEMIS is a valuable tool for increasing the partnership between FEMA and the States. This helps to coordinate the partnership with States by enabling the sharing of data and providing States with the same automated processes used by FEMA. NEMIS provides automated support for joint FEMA/State critical functions such as:

- Monitoring incidents
- Managing infrastructure projects and grants
- Providing individual and family grants
- Conducting Preliminary Damage Assessments (PDAs).

From an enterprise architecture development perspective, the State/FEMA partnership is crucial to all phases of NEMIS development, from requirements definition to testing and operations. To ensure that NEMIS provides support integral to State operations, State and National Emergency Management Association (NEMA) representatives are involved with the task forces which are defining the processes NEMIS will automate and are involved in designing the system.

In addition to the States, FEMA is in close partnership with several Federal agencies that provide disaster-related services. NEMIS will automate aspects of these relationships, such as the process of issuing and tracking mission assignments, providing reimbursement for transient accommodations, making SBA loan determinations, and others. In addition, FEMA provides and receives information from a number of other federal agencies. NEMIS is planned to interface with other agency systems to replace current manual or *ad hoc* transmission of data. More coordinated exchange of information reduces duplication of effort in providing disaster assistance and results in better customer service with a coordinated Federal effort.

FEMA Enterprise-Wide Geographic Information System (GIS)

Within FEMA, Geographic Information Systems (GISs) provide an good example of the opportunities and challenges of enterprise integration. Within FEMA, GIS is currently heavily used for floodplain mapping and insurance purposes. Data fusion from multiple sources, managed and presented within an interactive GIS, can also support situation assessment and planning for the future evolution of a crisis.. A representative example of current Map Analysis Center (MAC) GIS support during a hurricane threat and actual disaster consists of:

1. Executing a hurricane wind damage model prior to storm landfall and mapping the resultant probabilistic wind damage bands to help determine the required scope of the potential response
2. Integrating remote sensing data for damage assessment after landfall to assist in response deployments
3. Geocoding disaster assistance application data and overlaying the data with remote sensing data for a combined and more complete view of the disaster impact.

In the future with distributed GIS available to States and local government via VPNs and Extranets, a GIS map with building locations (drawn from a data base of residences and businesses) could be combined (for example) with sensor data on wind speed and

direction to show where evacuation must take place. This capability could also be used for crises involving releases of radioactive materials or toxic gas. Integrating additional GIS-encoded data about the current location of emergency vehicles, shelters, evacuation personnel, and relief supplies could facilitate State/local evacuation planning and response and recovery functions across a wide scope of disasters.

The structured discussions indicated a growing need for GIS products and services across the enterprise. Respondents expressed a need for a fully-integrated, enterprise-wide GIS capability with a supporting telecommunications backbone. FEMA is in the process of establishing an enterprise-wide, integrated GIS capability to support mitigation; preparedness, training, and exercises; and response and recovery operations. This enterprise capability will assist in geographical data analysis, provide an interface to exchange GIS data within FEMA as well as external organizations, and serve as a maintenance medium for geospatial information.

FEMA's GIS environment includes heterogeneous hardware and software tools. The mixed environment includes both UNIX and DOS/Windows-based hardware running MapInfo, ARC/INFO, and Emergency Information System (EIS) software. In addition, many custom applications have been developed that utilize the Special Flood Hazard Area (SFHA) data.

The Environmental Systems Research Institute, Inc. (ESRI) ARC/INFO data format for UNIX workstations has been chosen for FEMA SFHA Data Library because it offers the greatest flexibility and utility for development, applications, and management of digital geospatial SFHA data. The MapInfo program, ArcLink, provides conversion from the ARC/INFO data format to the MapInfo format. EIS has adopted the ESRI ArcView2 desktop mapping software as its platform for map display and query.

The GIS services currently required of the FEMA SFHA Data Library include activities that are commonly reported by U.S. Bureau of the Census county-equivalent units. Thus, the county equivalent unit is used as the tiling structure for data in the FEMA SFHA Data Library. This allows for a way to filter queries and store the data using a *Librarian* concept. This librarian concept is currently based on the ARC/INFO LIBRARIAN utility.

As noted in Section 1.12.2, FEMA has a major initiative in increasing the quantity and quality of data in its enterprise-wide GIS repository. Major efforts are also underway to exchange GIS information in higher-quality data formats not only within FEMA but also with FEMA's external business partners and customers. With fused, high quality, accurate and precise IFSAR and LIDAR floodplain data planned to be entered into the GIS environment over the next 5 to 7 years, the volume of data is expected to grow to be very large (estimated to be petabytes). Utilization of this data for mitigation, preparedness, and response and recovery applications will place a premium on distributed high-performance computing and networking.

In addition, the IT Mapping and Analysis Center (MAC) provides GIS support services to the Response and Recovery Directorate, including the Emergency Support Team (EST) and DFOs. This includes support for both response planning and actual disaster response operations. MAC also supports other FEMA directorates an as-required basis (e.g., support for exercises conducted by the Preparedness, Training, and Exercises Directorate). The MAC consists of mirrored UNIX data servers, PC client workstations, and various print/plot devices. It uses the FEMA standard desktop GIS, MapInfo Professional, for GIS analyses and map production. It also executes models, provided by the Mitigation Directorate, and uses the results in maps that support disaster response planning and operations. ARC/INFO is used as necessary for higher end GIS functions, but all final products are developed in MapInfo.

OHRM Corporate Data Base

Crisis response and recovery operations are widely recognized to be a human resources intense activity; not only requiring large numbers of volunteers, but also individuals with specialized skills such as leadership, planning and operations, command and control, communications, search and rescue, law enforcement, construction, transportation, medical, legal, housing, modeling and simulation, and fire-fighting to name a few. An important factor is also the availability, readiness, and training levels of adequate numbers of skilled personnel to support FEMA's major business functions of mitigation, preparedness, and response and recovery.

FEMA's Office of Human Resources Management (OHRM) manages a set of personnel information systems that can be viewed as a corporate resource data base. These IT systems including the Automated Deployment Data base (ADD), a payroll system, a standalone COTS automated classification system (COHO) and a standalone COTS automated knowledge-base for management of employee conduct and performance (CHINOOK). There is connectivity to several other systems and data bases (e.g., OPM, Department of Labor, National Finance Center, and Treasury). The CRD is comprised of data relative to processing personnel and payroll actions, reporting time and attendance, recording availability of personnel and tracking their assignments to disaster operations. It also can provide data to other FEMA organizational components through manual file transfers, including historical information for up to one year.

With appropriate security access controls and privacy considerations, information within the CRD can be integrated with financial management data to form a more complete resource information data base and management reporting system and improved input/output data/documents with archival capability for up to six years. Further development of the CRD will include interface with other enterprise-wide systems, automated timekeeping, workforce management, automated requesting and tracking of personnel action requests, and executive and managerial information systems to include use of electronic signatures.

Logistics Information Management System (LIMS)

Logistics Information Management System (LIMS) is FEMA's automated agency-wide property management and logistics information management support system. LIMS is in the process of being re-engineered to the LIMS 2000 system, which will be compatible in architecture with NEMIS. The future re-hosted system (LIMS 2000) will support agency-wide:

- **Property Management** (New item, Transfer, Loan, Local management functions, Administrative functions, Pre-positioning, Stock adjustment, Dispose, Kit management, Delivery *due in*)
- **Property Maintenance** (Warranty tracking, Maintenance history, Requirements, Work orders, Off-site maintenance, Schedules)
- **Resource Tracking** (Item request, Source, Item location, Item description, Tracking, Location history, Packaging, Transportation orders)
- **Acquisition** (New requests, Request approval, Tracking, Completed requests, Back charge, Budget, Account tracking)
- **Readiness** (Readiness measurement, Kit concepts)
- **Inventory Control and Stock Management** (Reorder, Stock levels)
- **Security, Fraud, Waste and Abuse** (User accounts, Access permissions, Transaction permissions, Security auditing, Reporting)
- **Interfaces to other systems** (Barcode, FEDLOG and in the future: Materiel systems, IFMIS, FACMAN, EIS, PRODOC, User badge system, NEMIS (NEMIS release 2))
- **Administrative Functions.**

LIMS 2000 supports the enterprise-wide standards of sharing of data among other systems, a data naming standard, standard tools, such as Oracle, FEMA LAN/WAN, PowerBuilder, MS Office Suite, and standard workstation architecture. The LIMS 2000 general system requirements include the following:

1. Interconnect all sites
2. Maintain a logistics data base for all sites and Regions
3. Provide all type of authorized users with functional support
4. Deliver complete and accurate data
5. Safeguard and manage all data
6. Provide programming features which allow authorized users to manage their own property
7. Integrate multiple systems including MERS
8. Formalize and automate the FEMA Standard Property Procedures
9. Minimize labor required to administer and operate the system
10. Maintain all hardware and software enterprise standards
11. Support operations and maintenance
12. Interconnect with other FEMA source systems
13. Maintain an ongoing working system to support a dynamic mission environment.

Integrated Financial Management Information System (IFMIS)

Financial management is an important business function associated with both disaster and non-disaster operations. It is a particularly important function with regard to management of FEMA's grants program with increasing requirements to tie or link financial reporting to performance measurements under the *Government Performance and Results Act (GPRA).*

The Integrated Financial Management Information System (IFMIS) was a system originally acquired from a software vendor. With re-hosting and re-engineering, IFMIS has become FEMA's enterprise-wide, financial management support system. The Office of Financial Management (OFM) has the responsibility for the development of IFMIS and its integration across the enterprise. The IFMIS enterprise-wide integration objectives are discussed below in terms of recent accomplishments.

IFMIS is the central component for achieving OFM's financial objectives to:

- **Improve financial management systems**
  - Automated the interface with Health and Human Services (HHS) Payments Management System to allow for automatic uploading of obligation data and downloading of draw-down information
  - Completed the automation of the interface between IFMIS and FEMA's printing management system so that data entry would no longer be duplicated
  - Started development and testing of an automated interface between the travel voucher preparation software and IFMIS to obviate the need for re-keying of the voucher.
- **Implement *Government Performance and Results Act (GPRA)* reporting**
  - Provided GPRA guidance and training to FEMA organizations
  - Finalized FEMA's *Strategic Plan*, mission statement, and goals and objectives with respect to GPRA implementation
  - Based on the updated *FEMA Strategic Plan*, provided input to the Agency's 1999 *Performance Plan*.
- **Issue accounting standards and financial statements**
- **Develop Human Resources within the Office of Financial Management**
  - Obtained senior management approval to submit a formal reorganization proposal to further refine the Chief Financial Officer (CFO) organizational structure and improve financial operations
  - Developed and conducted a disaster response tasking to other Federal agencies training for Agency program and finance managers
  - Increased agency training funds for specialized training for OFM staff.
- **Improve management of receivables**
  - Implemented the remitter's express system to collect user fees from the nuclear power plants
  - Obtaining tax identification numbers (TIN) for all debtors and vendors
  - Continued to collect on outstanding debts.
- **Ensure management accountability and control**
  - Continued to prepare financial statements of agency programs
  - Continued to oversee non-disaster-specific administrative expenses

- Completed reviews of the disbursement function to assess controls over the payment process
- Completed final draft report on eligible disaster cost
- Completed training course to financial managers on management and internal controls.

- **Modernize payments and business methods**
  - Continued to seek out efficient disbursement mechanisms to better utilize scarce resources
  - Developed alternatives for reimbursing employees for expenditures, normally done through impress funds
  - Implemented an electronic certification system where payments for disaster housing are made via host-to-host systems.
- **Improve administration of federal assistance programs**
  - Provided more than $2.6 billion dollars of grant funds to state and local governments
  - Directed Logistics Management Institute (LMI) to perform and independent assessment of the disaster assistance grants program.
- **Manage and administer the disaster relief fund**
  - Completed the reconciliation of the Disaster Relief Fund
  - Closed out 16 disasters.

Facilities Management System (FACMAN)

FACilities MANagement (FACMAN) is currently FEMA's system for providing facilities management support at Mt. Weather. It is intended to evolve into an enterprise-wide system and be integrated with NEMIS through the use of COTS products. (Note: There are a series of integrated systems in use at NETC that serve the same purpose as FACMAN. The NETC systems and FACMAN were the basis of a needs analysis that led to procurement of a COTS facility management package that will be an enterprise system.)

FACMAN has the following functional requirements:

- **Work plan tracking.** Facilitate the preparation, tracking, and reporting of resource requirements and utilization, including budgets and spending plans work plan tracking functions include:
  - Facilitate project budgeting and planning for 5 years
  - Support managing multiple activities and fund codes
  - Allow prioritizing projects on an annual basis
  - Support multiple level approvals for planning.
- **Requests for work.** Facilitate identifying, organizing, planning, tracking and reporting of facility-related maintenance activities. Requests for work functions include:
  - Support preventive maintenance based on calendar and cyclic requirements
  - Facilitate work order generation as rescheduled or on demand
  - Support central or multiple work order approvals

  - Provide automatic notification to customer of work order approval/change
  - Allow classification or categorizing of work
  - Facilitate cost estimating of work time and materials
  - Facilitate scheduling work assignments based on resources available or priority
  - Support tracking warranty
  - Facilitate failure analysis
  - Facilitate capturing actual costs and time
  - Facilitate tracking, reporting, and billing of tenant information.
- **Inventory control.** Facilitate the management, tracking and reporting of equipment, supplies, and services required for successful completion of facility maintenance operations and daily operations. Inventory control functions include:
  - Facilitate management, tracking and reporting of equipment, supplies, and service information (description, location, cost, measure, and type)
  - Facilitate managing multiple warehouses at different sites
  - Facilitate cross reference equipment and parts
  - Monitor stock level
  - Support barcoding
  - Support billing capability
  - Support automated reorder capability
  - Support manual reorder capability
  - Support tracking equipment usage.
- **Acquisitions.** Facilitate the management, tracking, and reporting of purchase and procurements. Acquisition functional requirements include:
  - Support tracking purchase request at multiple project/activity/shop levels
  - Provide automatic notification to warehouse/logistics and requestor
  - Support multiple approval levels for purchase
  - Support historical logging on purchase orders and requisitions information.
- **Financial management.** Facilitate the management, tracking, and reporting of project costs, spending, and budgeting and to facilitate the integration with IFMIS and NEMIS.
- **Receiving and Distribution.** Functional requirements include:
  - Tracking receiving for both partial and full shipments
  - Support stock issue
  - Support tracking item returns
  - Support automated incrementing/decrementing of inventory levels
  - Provide notice of receipt/acceptance of equipment, supplies, and services.
- **Action tracking** has the following functional requirements:
  - Support tracking and reporting activities such as correspondence, personnel actions, work assignments work orders, and purchase transactions
  - Provide information such as location, status, and responsible party, due date, priority, and subsequent routing.

Appendix N Identification and Description of Major FEMA IT Services in the Technical Reference Model (TRM)

This appendix identifies and describes the major IT services and architectural components that are incorporated into the Technical Reference Model. It identifies the relevant IT standards or standard tools, their status at FEMA, and provides appropriate comments. The list of IT services or architectural components have been arranged in alphabetical order.

In this appendix, the following terms have the meaning as indicated:

- ***Adopted*** means that the standard or standard tool has been formally accepted by the CIO for the service area or architectural component to which it refers.

- ***Under evaluation*** means that the standard or standard tool has not yet been formally accepted and is being actively evaluated or considered within FEMA.

- ***Suggested*** is a less strong term than *under evaluation*. It means that the IT Architecture Development Team has noted an opportunity and is *suggesting* that the standard or standard tool may have some merit to support the IT service area or architectural component. In the context of this document, *suggested* really means that there is a potential opportunity for technology insertion or standardization that ought to be more formally considered – business case and funding permitting.

- ***In-service use*** means that the standard or tool is currently being used within FEMA IT systems. It is subject to re-evaluation, re-engineering, or additional development prior to being formally adopted.

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Identification and Description of Major FEMA IT Services

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
800-number services	Program Services Division	TBD	Suggested service area	The Program Services Division operation at Mt. Weather is currently providing 800- number services and is suggested as the lead for enterprise development purposes. There is a recognized need for an enterprise approach to integrate and consolidate 800-number services to get maximum usage and cost savings out of the number of 800 number lines into FEMA.
Action tracking system or services	ITS Directorate	TBD	Suggested service area	Nearly every FEMA organization requested enterprise-wide action tracking services. Should be considered for integration with correspondence tracking, document management, digital library, electronic mailroom, legacy data capture, and text search components. This service area is under active evaluation by the IRB task force addressing combined areas of action tracking, correspondence control, and document management.
Automated tools for desktop applications/system software updates	PMG	Microsoft SMS	In-service use	The NEMIS Program Management Group is buying Microsoft SMS to distribute and audit software installations. Tivoli provides a suite of tools for software deployment, availability, security, service management, operations, managing business systems, and applications management. BMC Patrol monitors performance of Oracle and PowerBuilder. Please refer to the ITS Program Management Group (PMG).
		Tivoli	In-service use	
		BMC Patrol	In-service use	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Automated workflow management	PMG	Viewstar (currently)	In-service use IS & MT Modules	The NEMIS Program Management Group has used Viewstar for workflow services. However, the implementation has not been as successful as desired. Enterprise-wide automated workflow services are needed and should be integrated with document management and digital library services. Selection of an alternative product to Viewstar is under consideration by the NEMIS project. A table-based Oracle approach is being used in NEMIS HS & ES Modules. Please refer to the ITS Program Management Group
		Table-based Oracle approach	In service use HS & ES Modules	
Bridging heterogeneous distributed data bases	PMG	SQLNet	In-service use	The NEMIS PMG has used SQLNet and recommends it as an enterprise-wide approach for bridging heterogeneous distributed data bases. A number of organizations expressed interest in an ability to query and join distributed data bases.
Calendar and scheduling services	ITS Directorate	Schedule+	Under evaluation	Microsoft Schedule+ integrated with MS Office Exchange server and Outlook clients is under consideration as an enterprise-wide standard too for calendars and schedules.
CASE Tools	PMG	Sybase Powersoft PowerDesigner (formerly S-Designor)	Adopted	The NEMIS PMG has used S-Designor (now named PowerDesigner) for data modeling and PowerBuilder for rapid applications development. These tools are considered adopted for enterprise-wide development but are under continuous review and evaluation by the ITS Program Management Group. Visual Basic is under consideration for development of desktop applications. Oracle Developer 2000 is under consideration as a potential alternative to PowerDesigner. Please refer to the Program Management Group
		Sybase Powersoft PowerBuilder	Adopted (under re-evaluation)	
		Oracle Developer 2000	Under evaluation	
		Visual Basic	Under evaluation	
Configuration management (CM) Services	ITS Directorate (Configuration Management Branch - support from PMG)	PVCS Tracker and Version Manager	Adopted mandatory	The NEMIS PMG is currently using PVCS Tracker and Version Manager to provide configuration management services and suggests these as possible agency-wide tools. OpenView helps maintain CM control over FEMA networks. Additional CM tools may be needed as the ITA is implemented.
		OpenView	Adopted	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Correspondence tracking services/ action tracking document management	OS with ITS Directorate review	CIMS	In-service use	Nearly every organization identified a need for an enterprise-wide correspondence tracking system and/or they requested improvements to existing in-house systems. CIMS is mostly being used for Congressional and White House correspondence tracking. NEMIS has developed an approach for disaster-related correspondence action tracking. ACT2 primarily provides correspondence action tracking among various Directorates. A well-integrated enterprise-wide solution is needed to support FEMA business functions. Some business process re-engineering may also be required. The requirements need to address potential integration with action tracking, document management, digital library services, electronic mailroom, legacy data capture, archival systems for legal electronic records management, multimedia, workflow, and text search components. Potential impact on the networks also needs to be addressed. This service area is under active evaluation by the IRB task force addressing combined areas of action tracking, correspondence control, and document management.
		NEMIS approach to correspondence tracking	In-service use	
		ACT2	In-service use	
Data base management system and services	PMG	Oracle	In service	Oracle is adopted as FEMA enterprise-wide relational data base management system standard. Future enterprise adoption of Oracle 8, with incorporation of new object-relational features, is under consideration. Oracle 8 is under evaluation in NEMIS.
		Oracle 8	Under evaluation in NEMIS	
Data dictionary standardization	Configuration Management Branch	TBD	Suggested service area	Interviews conducted during the development of this IT Architecture indicated that data dictionaries for various enterprise- and program-centric IT systems are not harmonized. The Configuration Management Branch is the lead to develop the standards.
Data mining services	ITS Directorate	TBD	Suggested service area	Interviews with FEMA organizations indicated a strong desire to be able to perform data mining to identify trends and discover new relationships in corporate/distributed data.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Data warehousing services	PMG	TBD	Under evaluation	The NEMIS Program Management Group is the lead for development of data warehousing services. The NEMIS project is currently using and evaluating software for data warehousing services. Please refer to the ITS PMG.
Digital library services	PMG	TBD	Suggested service area	At the current time, NEMIS digital library services are mostly text-based. Structured discussion with FEMA organizational elements indicated an emerging requirement to extend digital libraries services to other complex objects including mixed-mode compound documents and data sets (hyperlinked text, graphics, multimedia, spreadsheets, GIS, etc.). This effort also needs to consider integration of: action tracking, correspondence tracking, document management, digital library, electronic mailroom, legacy data capture, workflow, multimedia, GIS, electronic records management, and text search components.
Digital signature services	ITS Directorate	Fortezza	Under evaluation	The ITS Directorate is the organizational lead for development of enterprise-wide digital signature services. A requirement for enterprise-wide digital signature services to meet electronic commerce requirements and legal and regulatory requirements was expressed by a number of FEMA organizations. There are significant management issues for standardization and integration of digital signature and digital certificate services across FEMA. In particular, human factors, level of acceptance of digital signatures, and associated costs (particularly for integration across IT systems). The NEMIS PMG has considered and rejected the Fortezza card. FIPS 186 is a Federal government digital signature standard, which needs to be considered. Other options that need to be considered to achieve increased interoperability with the public are RSA and PGP approaches.
		FIPS 186	Suggested	
		Rivest-Shamir-Adelman (RSA)	Suggested	
		Pretty Good Privacy (PGP)	Suggested	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Distance learning technology	ITS Directorate	EENET	Adopted	Organizational elements with strong training missions (e.g., PT&E, R&R, Mitigation, and National Fire Academy) suggested development of additional enterprise-wide distance learning tools and techniques. The Emergency Education Network (EENET) is a satellite-based system that is currently being successfully used. Collaboration with other Federal agencies and universities to use the Internet for interactive distance learning needs to be explored. Distance learning technology and services can provide significant cost-benefit with outreach to large numbers of students. Network multicast issues and bandwidth concerns for large multimedia objects would also need to be addressed.
		Other Internet, Intranet, or Extranet approaches	Suggested	
Distributed exercise planning, reconstruction, and analysis services	PTE USFA	TBD	Suggested service area	PT&E, R&R, Mitigation, and the National Fire Academy are proponents of this type of collaborative service.
Distributed planning tools	ITS Directorate	TBD	Suggested service area	A number of FEMA organizational elements expressed a desire for identification of enterprise-wide services and tools to support distributed planning operations. See Section 1.12.6 for additional details on the desired distributed planning service.
Document Management System (DMS)	PMG	TBD	Suggested service area	Nearly every FEMA organization expressed a need for a well-integrated, enterprise-wide document management system. The NEMIS PMG is the lead development and integration activity. Selection of a standard or standard DMS tool also needs to consider integration of: action tracking, correspondence tracking, electronic records management, digital library, electronic mailroom, legacy data capture, workflow, multimedia, and text search. This service area is under active evaluation by the IRB task force addressing combined areas of action tracking, correspondence control, and document management.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Economic forecasting and modeling tools	TBD	TBD	Suggested service area	The Office of Financial Management, the Response and Recovery Directorate, the Mitigation Directorate, and the National Fire Academy expressed interest in the identification of, and development of, enterprise-wide standardized tools for economic forecasting and modeling. Section 1.12.6 provides additional details on the desired economic forecasting and modeling tools that are desired.
Electronic Commerce (EC) and Electronic Data Interchange (EDI) services	ITS Directorate with support from the Office of Financial Management and the Operations Support Directorate	FIPS 161	Suggested	The ITS Directorate with support from the Office of Financial Management (OFM) and the Operations Support Directorate (OSD) is the organizational lead for the development of enterprise-wide EC and EDI services. FIPS 161 is the Federal government standard for EDI and is suggested as a standard. FIPS 161 sanctions the use of ANSI X12 EDI transaction sets and UN EDIFACT messages. A potential requirement exists to develop: 1) an enterprise-wide approach to secure credit card transactions on the Web using the Secure Sockets Layer (SSL) and 2) a potential XML-and/or Java-based approach for electronic commerce transactions as an alternative to X12 on the Internet. In the interest of open systems, the FEMA enterprise-wide approach to EC needs to be broader than just acquisition and provisioning and cover elements of electronic document submission, transportation, invoicing, bills of lading, catalogs, construction, materials expediting, medical, etc. Use of open systems EDI standards needs to be considered to support FEMA logistics operations under OSD.
		ANSI X12 EDI	Suggested	
		UN EDIFACT	Suggested for international use	
		Secure credit card approach on the WEB using Secure Sockets Layer (SSL)	Suggested	
		XML-and/or Java-based WEB approach	Suggested	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Electronic filing and/or tele-registration services	PMG	NEMIS approach to tele-registration	In-service use	The NEMIS has developed a technical approach to tele-registration that is recommended as a basis for a potential enterprise-wide solution. This service area also needs to consider an enterprise-wide approach for electronic grants application and management. This effort can benefit from integration of electronic filing with: document management, digital library services, text search, electronic mailroom, and workflow. An opportunity also exists to leverage results of the Inter-agency Electronic Grants Working Group (www.Financenet.gov/iaegc). See also the electronic grants service below.
Electronic forms services	Operations Support Directorate with support from ITS Directorate	Jetform Formflow	Under evaluation	Jetform is under consideration and evaluation by the Operations Support Directorate (OSD). Jetform is used by many other federal agencies thereby promoting interoperability. However, FormFlow files are saved in proprietary format. Data can be saved as dBase files – also proprietary file format and not accepted by NARA. Would need to save and archive as delimited ASCII to meet NARA requirements. Additional standards profiling of JetForm FormFlow is needed to promote it to archival status.
Electronic Funds Transfer (EFT)	ITS Directorate with support from Office of Financial Management	ACH transactions	Suggested service area and suggested standard	Automated Clearing House (ACH) transactions are the accepted method of electronic funds transfers with the banking community and are suggested.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Electronic mailroom services	OS with PMG/ITS support	TBD	Suggested service area	A number of FEMA organizations identified automated 24/7 electronic mailroom services (such as automated message routing, receipting, date-time stamping, validation services, print on-demand, and delivery services) as an enterprise-wide requirement. The Operations Support Division (OSD) is the lead for defining processes and functions for the mailroom. The NEMIS PMG will provide IT systems support. This service area is under active evaluation by the IRB task force addressing combined areas of action tracking, correspondence control, and document management. A well integrated solution is desired which integrates electronic mailroom services with document management, routing and workflow, digital library services, date-time stamping and receipting services, scanning and conversion, indexing services, digital library services, and correspondence and action tracking. See Section 1.12.6 for a high-level description of key electronic mailroom architectural components.
Electronic publishing services	Operations Support Directorate	QuarkXpress	In-service use	Within the Operations Support Directorate, the electronic publishing concept has evolved to *Electronic Design and Pre-Press (EDPP)* services – creating files to be imaged on high-resolution devices. Standard tools (e.g., QuarkXpress, Pagemaker, and Framemaker) are for page layout and produce Postscript Level 2. Concern is that file formats for these products are proprietary. There is general concern about NARA acceptance of the file formats for the electronic copy produced by these standard tools. Saving documents in open systems file formats is the preferred architectural solution and is supported by NARA. PDF is acceptable for Web dissemination but not high resolution for high-end image setters. PDF is also acceptable for delivery of composed final-form documents for playback on desktop systems.
		Pagemaker	In-service use	
		Framemaker	In-service use	
		Postscript Level 2	In service use	
		Open systems standards (SGML/XML and associated style files, CGM, JPEG, IGES)	Suggested (some limited in-service use)	
		PDF (Acrobat)	In-service use	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
E-mail services	ITS Directorate	Lotus cc:Mail	Adopted (but under review)	Microsoft Exchange with Outlook clients is under evaluation as a standard tool to replace cc:Mail. In general, there is a desire for enterprise-wide E-mail services to comply to widely-implemented Internet standards: MIME, S/MIME, SMTP, POP-3, IMAP, LDAP.
		Microsoft Exchange with Outlook clients	Adopted	
Engineering drawing services	ITS Directorate with support from Operations Support Directorate	AutoCAD (with DXF file format)	In-service use	AutoCAD currently is in-service as an engineering drawing standard tool at FEMA. AutoCAD uses the Autodesk Drawing Exchange Format (DXF) as the file format. FEMA currently has over 10,000 drawings as AutoCAD files at Mt. Weather. DXF is a widely implemented industry standard that is not currently acceptable to NARA for archival purposes. IGES (Initial Graphics Exchange Standard) is suggested as a future FEMA enterprise-wide open systems engineering drawing standard but needs additional profiling and customization. IGES is under consideration by NARA as an open systems archival approach. See the discussion on IGES in Appendix O .
		IGES	Suggested	
Geographic Information System (GIS) services	ITS Directorate with support from mitigation directorate	MapInfo Professional (for Desktop GIS)	Adopted (see comments)	The *Q3 Flood Data Specifications (Draft)* available on the FEMA Web site provides definitive TRM guidelines for GIS products and standard tools. See also Appendix M (GIS).
		ARCINFO	Adopted	
		Q3 flood data products	Adopted	
		DLG formats	Adopted	
		TIFF	Adopted	
		FIPS 173 (SDTS)	Adopted	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Grants Management System services	PMG	IAEGC standards: - Common multi-agency data dictionary - ANSI X12 EDI - Interactive Web - Java applets - SGML/XML (under consideration)	Service area is under evaluation by ITS PMG IAEGC standards are suggested for consideration	Electronic grants management and reporting is an important business area for FEMA which can benefit from a standardized, enterprise-wide solution. The NEMIS PMG is the organizational lead. An enterprise-wide solution for grants management is a NEMIS Phase 2 requirement. This service area can benefit from integration of: electronic filing services, document management system services, electronic commerce, electronic funds transfer, digital library services, text search, electronic mailroom, and workflow services. Opportunity also exists to leverage results of the Inter-agency Electronic Grants Working Group (IAEGC) (www.Financenet.gov/iaegc) which is developing and demonstrating standards for multi-agency grants management. The IAEGC standards-based approach is suggested for consideration.
Graphics art and drawing toolkit(s)	ITS Directorate with support from Operations Support Directorate (Printing and Publishing Branch)	Visio	In-service use	The graphics art and drawing tools in this section are currently in use in their native file formats. A concern is that the proprietary formats may not be acceptable to NARA for archival purposes without detailed profiling and additional file definition. Computer Graphics Metafile (CGM) is the preferred open systems file format, and is under consideration at NARA. Operations Support Directorate Infogram #98-06 states that for illustrations and preparing files for digital printing, use Adobe Illustrator, Macromedia Freehand, or CorelDraw. Visio is also acceptable for illustrations to be published. Power Point is acceptable for presentation graphics only.
		Power Point	In-service use	
		Adobe Illustrator	In-service use	
		Adobe Photoshop	In-service use	
		Macromedia Freehand	In-service use	
		CorelDraw	In-service use	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Graphics file formats	ITS Directorate with support from Operations Support Directorate (Printing and Publishing Branch)	Native file formats for graphics art tools (above)	In-service use	Native file formats for enterprise-wide graphics art tools (identified above) are currently in use, though FEMA organizations are cautioned that they will require additional profiling, validation, versioning, and file definition for long-term legal archival storage purposes. TIFF, GIF, BMP, WMF, PNG, and EPS are widely implemented industry standards and are currently allowable FEMA enterprise-wide graphics file formats. However, they will require additional profiling, definition, validation, versioning, and file definition for promotion to full long-term legal archive status. Compressed TIFF is the preferred method for interchanging raster-scanned or bitmap graphics. TIFF will require additional profiling and validation activity to promote it to full archival capability. In particular, allowable TIFF tags must be defined and validated for IT systems that use TIFF files. In addition, allowable file compression algorithms (e.g., CCITT Group 4 .T6 compression, JPEG compression) must be further defined for TIFF files across the enterprise. Use of open systems file formats is suggested, though it is recognized and acknowledged that they require additional profiling, definition, and testing.
		Compressed Tagged Image File Format (TIFF)	In-service use	
		Graphics Interchange Format (GIF)	In-service use	
		Microsoft Bitmap (BMP)	In-service use	
		Windows Metafile (WMF)	In-service use	
		Portable Network Graphics (PNG) format	In-service use	
		Encapsulated Postscript (EPS)	In-service use	
		Open systems file formats (CGM, CCITT Group 4, JPEG, M-JPEG)	Suggested	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Help desk services	Operations Division at MWEAC for IT Help Desk services	Remedy	Adopted	As with the 800 number services, a number of FEMA organizations expressed a need for standardization of an enterprise-wide approach to providing help desk services. Help desk services fall into two basic categories: 1) help desk services for IT systems provided to FEMA employee, and 2) help desk services for external customers such as disaster victims seeking help or information (e.g., Human Services Support). In general, there is a need or desire for enterprise-wide standardization for both of these help desk functions. The ITS Operations Division is the organizational lead with the Help Desk approach using Remedy at Mount Weather (MWEAC) determined to be the preferred enterprise-wide solution for providing help desk services. The NEMIS PMG is suggested as the lead for development of enterprise-wide help desk services with external customers. Increased integration with common 800-number services is desired. Additional tools may be required for enterprise-wide adoption of help desk services.
	PMG for Help Desk services for external customers	TBD	Suggested service area	
High-bandwidth management services with adaptive Quality of Service (QoS) capability	ITS Engineering Division	Asynchronous Transfer Mode (ATM)	Under evaluation	The ITS Engineering Division is currently evaluating high-bandwidth management services using adaptive Quality of Service (QoS) capability provided by ATM. A series of demonstrations are being conducted. Section 3 of this *FEMA IT Architecture* further describes Asynchronous Transfer Mode (ATM). ATM is a transfer protocol that provides scaleable bandwidth; integrated voice, video, and data; and native adaptive QoS services.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
High-performance computing and communications (HPCC) services	ITS Directorate	TBD	Suggested service area	The ITS Directorate is the organization lead for development of HPCC services, subject to business case analysis. A number of FEMA organizations suggested potential applications that might require high-performance computing and communications resources (e.g., virtual reality, distance learning, distributed interactive simulation, interactive GIS, and digital library applications). If HPCC services are required to meet the emerging requirements, they should be provided in a standardized enterprise-wide fashion. As an important IT architectural consideration, the FEMA ITS Directorate will explore avenues for collaboration with FEMA's business partners, other Federal agencies, the CIO Counsel, and universities. See also the component on Next Generation Internet and Internet2.
Imaging system services	OS with ITS Directorate review	ZyImage Visustar Powerscan, Filenet, OTG	In-service use (under re-evaluation)	There is a generally recognized need for an enterprise-wide approach for providing digital imaging services for scanned documents. ZyImage is currently a part of CIMS, but provides little or no records keeping capability and doesn't conform to emerging NARA optical imaging and records management standards. Images are saved as TIFF files with potential to be altered via pixel editing with minimal controls for maintaining scanned document data integrity. An enterprise-wide solution needs to consider integration with OCR techniques, text search and indexing, document management, digital libraries, electronic records management, and archival storage components.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Information dissemination services	PMG in coordination with EIMA	Oracle Web Server	In-service use	The NEMIS PMG with close coordination from the Office of Emergency Information and Media Affairs (EIMA) is the suggested organization lead for development of enterprise-wide information dissemination services. NEMIS is using Oracle Web Server for information dissemination services and recommends it as an enterprise-wide solution. Please refer to the Program Management Group. PointCast is currently being used by EIMA for streaming audio and video on the Web PointCast will require additional profiling, development, and definition to promote it to archival status and to provide a basis of support that will be acceptable to NARA.
		PointCast	In-service use	
Integrated voice, video, and data applications (with VTC)	ITS Engineering Division	Asynchronous Transfer Mode (ATM)	Under evaluation	Most of the FEMA organizational elements that were interviewed during the development of this initial *IT Architecture* identified a requirement for FEMA to develop an enterprise-wide integrated approach to voice, video, and data applications (with video teleconferencing). The ITS Directorate Engineering Division is the organizational lead for the development of standardized network applications that support this architectural component. ATM provides native protocol support for integrated voice, video, and data applications (see Section 3) and is currently under evaluation in a series of demonstrations sponsored by the Engineering Division.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Intelligent Collaboration and Visualization (IC&V) – groupware services	ITS Directorate	TBD Group Systems from Ventana Corp.	Suggested as a service area Under evaluation	IC&V groupware services relate to integrated voice, video, and data applications above with the added dimension of integration of digital library services, distance learning, and interactive GIS. The requirement is to support intelligent collaboration and visualization on complex objects across the enterprise. This architectural component also relates to distributed planning and distributed economic modeling. This architectural component also provides enabling technology to support distributed exercise planning and distributed modeling and simulations services. See Section 1.12.6 for additional details of this suggested service area. Nearly every FEMA organizational element identified IC&V services as an important future service area. The Regional Offices expressed a desire to collaborate and evaluate this technology in prototypes and demonstrations. The Group Systems approach from Ventana is under evaluation by PT&E.
Internet technology services	ITS Directorate	Java Secure Sockets Layer MIME w/Base64 Encoding S/MIME HTTP POP-3 IMAP SMTP LDAP TCP/IP HTML Dynamic HTML XML with style sheets CGI scripts	All suggested	In developing this initial *IT Architecture*, a number of FEMA organizational elements identified a requirement to broaden the perception of potential use of the Internet beyond just providing information dissemination services. In particular, they sought utilization of the Internet and Internet technologies as a tool to support business functions in such areas as: distributed planning, conferencing and chat, desktop collaboration, validation of electronically-filed documents and data sets, visualization, messaging, FTP, shared office automation applications, originator authentication, and archival storage and retrieval. The ITS Directorate is the organizational lead for development of enterprise-wide approaches and solutions for advanced Internet services of this type. Each of the suggested standards will require additional profiling and development

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Kiosks (information)	TBD	TBD	Suggested service area	Portable, distributed information kiosks, which might be set up in an emergency to support large-scale response and recovery operations, have been suggested as a potential technology and approach to consider to capture data and to provide information dissemination in a disaster area. It is envisioned that the kiosks might exploit existing services in a region such as fiber optic communications, phone lines, cellular services, indigenous cell and frame relay networks, and cable in a given region. This *FEMA IT Architecture* establishes that if information kiosks are developed as an architectural component that they should be developed consistently as an enterprise-wide solution; and be consistent with NEMIS. The organizational lead is yet to be determined.
Legacy data capture (scanning, conversion, OCR)	PMG	Open systems file formats	Suggested service area	The NEMIS PMG is the organizational lead for development of an enterprise-wide approach for legacy data capture. Legacy data capture services broadly include optical scanning, conversion and translation services, optical character recognition (OCR) for text and intelligent recognition of objects and vectors in figures and illustrations. See Section 1.12.6 for details on this suggested service area. This architectural component needs to be closely integrated with electronic filing services, document management system services, electronic commerce, electronic funds transfer, digital library services, text search, electronic mailroom, and workflow services. Particular emphasis needs to be placed on conversion and translation to open systems file formats. Standard tools also need to be identified.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Long-term electronic records management and archiving services	ITS Directorate with support from Operations Support Directorate (Program Services Division) and OGC	Open systems file formats	Suggested service area and suggested use of open systems standards	The ITS Directorate in close coordination with OGC and the Program Services Division is the organizational lead for the development of services to support long-term electronic records management and archival storage in a legal environment. NEMIS currently provides an environment that supports long-term records management and archiving services and should be considered as the basis for development of enterprise-wide architectural services in this area. Additional analysis of emerging NARA requirements and guidelines will be necessary, as will additional profiling and definition of standards.
Mobile/nomadic computing services	ITS Directorate (Engineering Division in coordination with PMG)	PCS	Suggested service area PCS technology is under evaluation	The NEMIS PMG is currently developing mobile and nomadic computing services. This is being coordinated with the Engineering Division, which is currently evaluating PCS technology as part of a separate Network Technology Architecture task. As a result of the structured discussions, the most important early requirement appears to be development of a good distributed e-mail service and/or messaging services. See also e-mail services and PCS services. Identification of mobile/nomadic services includes future specification and integration of laptops, modems and protocols, wireless services, applications, interfaces, thin clients, and possibly Global Positioning System (GPS).

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Modeling and Simulation (M&S) - Distributed Interactive Simulation (DIS)	ITS Directorate	DOD DIS protocols	Suggested service area Suggested standards base	The Department of Defense (DOD) Modeling and Simulation Office has developed protocols for Distributed Interactive Simulation (DIS). DIS can potentially provide FEMA with a capability to model and simulate disasters across distributed networks for training purposes. Mitigation, PT&E, R&R, and National Fire Academy are interested in this technology. With additional definition and business case analysis, the ITS Directorate is the lead for systems engineering and development for this type of technology. See also the distributed exercise planning, reconstruction, and analysis services. Also, see Section 1.12.6 for additional details.
Multimedia integration services	ITS Directorate	MPEG	Suggested	The ITS Directorate is the organizational lead for systems engineering and integration of multimedia services. A number of FEMA organizations expressed interest in multimedia services to provide improved training and information dissemination. MPEG and Motion-JPEG are open systems standards and suggested. Microsoft Audio-Visual Interleave (AVI) format and WAV format (for recorded sound) are widely implemented de facto standards and are currently being used. MIDI (Musical Instrument Device Interface) is an industry standard for synthetic sound. General MIDI is suggested as the APP. PointCast is currently being used by EIMA for streaming audio and video via the Web. All of the multimedia formats place potential demands on the network. All of the formats require additional profiling and definition for long-term archival storage to meet NARA requirements. Multimedia services also need to be integrated with digital library services. The quality of multimedia playback frequently depends on specialized hardware raising potential legal and regulatory concerns.
		M-JPEG	Suggested	
		AVI	In-service use	
		WAV	In-service use	
		General MIDI	Suggested	
		PointCast	In-service use	
		Multimedia hardware: Sound board CD-ROM drive Digital Versatile Disk (DVD) drive Digital Cameras (still and video) Microphones Video capture boards Mass storage and optical jukebox Multimedia *pump*	Suggested	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Next Generation Internet (NGI) and Internet2 services	ITS Directorate	Emerging NGI and Internet2 standards	Suggested service area Suggested standards	Excellent opportunities exist for FEMA to collaborate with other Federal agencies which are already participating in the Next Generation Internet (NGI) project and with over 100 universities which are part of the Inernet2 consortium. NGI and Internet2 are important development efforts addressing: scaleable high-bandwidth, Quality of Service, Internet security, digital library science, multimedia, storage resource brokers, distributed high-performance computing and metacomputing; and storage and retrieval of very large archives (e.g., petabytes). See also Section 1.12.6. Any potential FEMA involvement or collaboration with NGI and Internet2 participants needs to be coordinated across the enterprise with the ITS Directorate as the organizational lead.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Office automation tools	ITS Directorate	Microsoft Office 97 Professional Edition	Adopted	Components of the current FEMA office automation toolkit include: - Word processor (Word) - Spreadsheet (Excel) - Presentation graphics (Power Point) - Desktop relational data base management (Access) - E-mail client (Exchange Server and Outlook) - Web browser and plug-ins (Internet Explorer) - Web page authoring (Word augmented by FrontPage) - Calendar tool (scheduling) (Schedule+) - Contact manager (Schedule+ and Outlook) - Task manager (simple) (Outlook) - Project Management (MS Project) - Journaling tool (Outlook) - Windows environment (NT, Win 95/98) - Multimedia playback (Media Player) File formats are proprietary and require additional profiling to meet archival storage requirements. Future needed capability includes authoring of XML (as an open systems replacement for HTML on the Web). XML is expected to be in next release of MS Office. SGML and XML tools are widely available. Document Type Definitions and style sheets need to be developed and standardized.
		File formats from MS Office 97	Adopted	
		SGML-based and XML-based documents containing open systems graphics and multimedia objects	Suggested	
On-Line Analytical Processing (OLAP) and On-line Transaction Processing (OLTP) Tools	ITS Directorate	TBD	Suggested service area	OLAP and OLTP tools are a comparatively new class of products that provide capabilities as suggested by their names. They facilitate automated on-line processing of data bases including aggregating and presenting results for management review. OFM, in particular, expressed interest in this class of products. These products should be evaluated for potential standardization across the enterprise. See Section 1.12.6 for additional details on OLAP and OLTP.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Operating System Environment (Desktop)	ITS Directorate	Microsoft Windows NT	Adopted	Microsoft Windows is the accepted desktop operating system environment. Selection of Windows NT or Windows 95 for any particular workstation is made on a case-by-case basis.
		Windows 95	Adopted	
Personal Communications System (PCS) services	Engineering Division	TBD	Under evaluation	Digital PCS services provide an opportunity for integrated e-mail, messaging, mobile computing, remote data base access, and digital cellular telephone services. Structured discussions with the Directorates indicated that PCS is becoming increasingly attractive to FEMA field personnel engaged in response and recovery operations and other field services (e.g., surveys and inspections). PCS needs to be considered as an enterprise-wide opportunity. The Engineering Division is currently evaluating PCS as part of a separate study on FEMA's network architecture
Print On-Demand and Publish On-Demand Services	OSD	Xerox DocuTech	In-service use	The Operations Support Directorate is the organizational lead for development of enterprise-wide, high-volume, print-on-demand and publish-on demand services. Xerox DocuTech and Docucolor are currently in-service and have been suggested by OSD as prospective adopted standard tools.
		Xerox DocuColor	In-service use	
Systems engineering and development toolkit (including CASE)	Engineering Division in coordination with PMG	Software Engineering Institute (SEI) methodology	Suggested methodology	The ITS Engineering Division in close coordination with the NEMIS PMG is the organizational lead for development of enterprise-wide standard tools and techniques for systems engineering. Identification of additional tools and techniques will be made in future revisions to this IT Architecture. SEI methodology is suggested for development of IT systems and would need to be applied on a case-by-case basis.

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Teleconferencing (voice only)	NNOC	TBD	Suggested	A number of FEMA organizations expressed a need for improvements in voice-only teleconferencing services especially in the areas of voice quality and streamlined approaches to set up teleconferences. The National Network Operations Center at Mt. Weather is assigned the organizational lead for development of improved capabilities.
Text search services	PMG	Oracle ConText	In-service use	Most of the FEMA organizations that were interviewed expressed a need for an enterprise-wide text search and indexing capability. This architectural component needs to be integrated with office automation, legacy data capture, document management, data base management services, digital library services, correspondence and action tracking, and others to achieve enterprise-wide capabilities. The NEMIS PMG is the organizational lead for development and has used Oracle ConText for text search and indexing. Other text search engines may need to be evaluated and explored.
Video teleconferencing services (VTC) (video and voice only)	ITS Directorate	VTC system in ITS Directorate managed by Engineering Division	In-service use	Most of the FEMA organizations that were interviewed identified a requirement for high-quality video teleconferencing services to support distributed planning and liaison functions with their business partners. Architectural issues that to be addressed include bandwidth utilization and electronic capture of business-significant proceedings (e.g., minutes) to support legal and regulatory requirements. Desktop video conferencing using Microsoft NetMeeting is suggested for potential evaluation.
		Microsoft NetMeeting integrated within office automation toolkit	Suggested	

IT Service or Architectural Component	FEMA Organizational Lead	Relevant Standards or Standard Tools	Status	Comment
Virtual reality representation mechanisms (VRML and 3-D stereoscopic viewing)	ITS Directorate	ISO VRML	Suggested service area ISO VRML suggested as an open systems standard	The Mitigation Directorate, PT&E, R&R, and the National Fire Academy are proponents for the use of virtual reality representation mechanisms in simulations for distance learning and training purposes. Explicit operational requirements and business case for virtual reality (VR) need to be developed. A prototyping approach is suggested in close collaboration with other federal agencies (e.g., DARPA, NOAA). 3-D stereoscopic viewing is possible using CAVE technology that permits a simulated walkthrough of the operational scenario. The *FEMA IT Architecture* establishes that any virtual reality representation and stereoscopic viewing services (including hardware and software) shall be developed as an enterprise-wide architectural component. Due consideration must be given to the potential impact of VR on the network. The use of ISO-compliant Virtual Reality Modeling Language (VRML) is suggested as an open systems approach. The ITS Directorate is the organizational lead.
Voice mail services	ITS Directorate	TBD	Suggested	Interviews with a number of FEMA organizational units indicated a need to standardize voice mail services across the enterprise. Several voce mail systems are currently in use. The ITS Directorate is the organizational lead and will promulgate the approved enterprise-wide standard in future revisions to this document.

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Appendix O Profiles of Major IT Standards

This appendix provides amplifying information on Section 2.3 and identifies a number of selected standards that offers significant potential for achieving openness across FEMA's IT systems in the future.

Standard Generalized Markup Language (SGML) and Extensible Markup Language (XML)

The Standard Generalized Markup Language (SGML) is an internationally-accepted open systems standard (ISO 8879) published in 1986. XML (Extensible Markup Language) is a recently proposed dialect or implementation of SGML that is much simpler to implement and is planned to supplant HTML on the World Wide Web. The fundamental requirement for XML is that documents be *well-structured*. An SGML Document Type Definition (DTD) formally defines the required structure and content elements of a document. A DTD is considered optional for XML compliance. SGML/XML has generated a considerable amount of interest among various federal agencies as an open systems approach to the interchange of structured text documents. In addition, SGML (and XML) is the only recognized approach for long-term archival storage and retrieval of text-based documents by NARA.

For FEMA, SGML/XML represents the only internationally-recognized standard for markup of the structure and content of text documents. SGML is data base-oriented and is intrinsically pageless. SGML supports hyperlinking to graphics and multimedia objects. SGML is also the basis for HTML, which is used on the WWW on the Internet. SGML provides a platform-independent method for describing both the content and structure of compound documents. In particular, SGML provides facilities for defining the following:

- Structure of the document
- Characters transmitted in a document
- External information incorporated in the document such as external graphics and multimedia files
- Special features for marking up text
- How text is to be processed by the receiving system (e.g., support for workflow).

The technology base for SGML is over 10 years old. The grammatical nature of SGML makes it a stable standard. What is not so standard are the myriad of implementations of SGML (e.g., tables, common text, and mathematics formats) and concurrence on external entities (e.g., image formats). Not withstanding these limitations, SGML has proved to be extremely viable option for platform independent document encoding.

For FEMA, SGML and XML represent a particularly valuable future architectural approach to represent documents and to interchange them with FEMA's business partners in a well-disciplined, open, and structured manner in the future. In contrast, most

interchanges of information today are via word processor file formats, which provide only a loose structure for document and data interchange. With the anticipated replacement of HTML by XML on the Web, the next generation of office automation products and word processors are projected to be XML-compliant. This will present important new opportunities for FEMA. In addition, XML is rapidly gaining momentum as a preferred approach for electronic commerce via the Internet. With this approach, on-line data validation techniques using Java are becoming popular.

For FEMA, the most important step would be the development of a series of SGML document type definitions (DTDs) for the various document types, which are typically interchanged amongst FEMA's business partners; as well as seeking concurrence of FEMA's business partners on SGML/XML as the preferred open systems interchange format for text-based documents in the future. SGML and XML has the potential to be the preferred approach to the interchange of structured electronic documents.

Geographic Information System (GIS) Standards and Standard Tools

The *Q3 Flood Data Specifications (Draft)* document available from the FEMA Web site provides details of the GIS Technical Reference Model and associated standards profiles for FEMA's GIS products. Please refer to that document for additional details. Per that reference, the Digital Line Graph Level 3 (DLG3) has been adopted by FEMA as the standard data model for the distribution and storage of digital Flood Insurance Rate Map (DFIRM) products. DLG3 is FEMA's data distribution format until specifications for data distribution that meet the Spatial Data Transfer Standard (SDTS) (FIPS 173) can be implemented.

The USGS is migrating to the DLG-E (Enhanced) data model from the existing DLG3 model. DLG-E is designed for the capture, storage, and processing of USGS' spatial data. DLG-E data will be distributed by USGS in SDTS format. DLG-E will provide an internal data structure with a more flexible method of storing feature characteristics, metadata, and topological (spatial relationships) information for two-dimensional data. DLG-E will permit features and attributes to be handled separately, with classification criteria for over 200 feature types. An additional improvement will be the inclusion of feature names (e.g., stream or road names) and the treatment of spatial elements as objects. This object-oriented data model will allow for multiple spatial relationships among features to be identified and queried by their natural classification groups, such as the Great Lakes or the Florida Keys.

The USGS National Mapping Division (NMD) continues its work pertinent to the DLG-E model and its transfer to SDTS. Many software vendors have implemented, or are in the process of implementing, SDTS translators.

As an IT architectural consideration, FEMA is investigating the use of the DLG-E data model for data storage and processing. FEMA plans to adopt the SDTS standards for

distribution of its geospatial data in compliance with the FIPS when development of appropriate specifications and mechanisms has been finalized.

FEMA Q3 flood data products are provided in public domain transfer format (DLG and TIFF) as well as proprietary formats (ARC/INFO and MapInfo). Although the Federal government supports several geospatial data models, the USGS DLG standard offers one of the more efficient and widely recognized data formats for the distribution of vector data. DLG-3 supports basic topology (spatial relationships between data elements) in a vector data model, but is limited in the area of feature annotation, non-numeric data elements, and named features. FEMA is in the process of developing and implementing specifications for data sets in SDTS, and when this effort is complete, it is expected that SDTS will replace DLG as FEMA's distributed public domain vector format.

ARC/INFO and MapInfo are used by FEMA as internal working files; however, due to the popularity and utility of these two formats, they are distributed as well. Q3 raster FIRMs are distributed in TIFF format compressed using CCITT Group 4.

Computer Graphics Metafile (CGM)

Originally defined by ISO in 1987, the CGM standard was designed as a basic, general purpose, two-dimensional, graphical interchange format. A CGM metafile is not a picture, only a description of a picture. Over the years, the CGM standard has been amended a number of times in order to increase its graphical representation power, and today is the preferred, internationally-accepted, open systems, standard for the representation of graphics such as technical illustrations and vector drawings. A recent amendment to the CGM standard allows application structuring and the inclusion of hot links in CGM-compliant files. A color addendum has also been added.

Well over 100 commercial implementations of CGM exist in software products to date. The CGM standard is stable and supported by a broad base of software packages on almost all hardware platforms; however, interoperability is somewhat hampered by inconsistent implementations. As a result, Application Portability Profiles (APPs) need to be developed to standardize these features between trading partners. These APPs have been a major issue in the CGM community and the newly established CGM Open Group is attempting to set standards for the APPs to achieve interoperability. In 1995, CGM became a registered MIME type. For FEMA, CGM could evolve to become the preferred standard for exchanging simple to moderately complex drawings among business partners. NARA has expressed strong interest in CGM as an archival standard. The efforts of the CGM Open Group should be closely tracked and monitored. CGM has the potential to become the preferred open systems approach for the interchange of technical drawings and illustrations across the FEMA enterprise.

Consultative Committee for International Telephony and Telegraphy (CCITT) Group 4 Raster Image Standard. (Note: CCITT has been renamed the International Telegraphic Union (ITU))

The CCITT Group 4 raster image standard is a widely implemented facsimile standard for black and white images (i.e., images not containing gray-scale or color). The standard contains the .T6 recommendation for file compression using a run-length encoring (RLE) algorithm. For the typical typed documents and line art illustrations, CCITT Group 4 encoding offers compression ratios of nominally 20 to 30 to1. Group 4 viewers are widely available. For FEMA, Group 4 is the preferred, internationally-accepted method of interchange of black and white raster-scanned images and illustrations. Group 4 is also the preferred mechanism for interchange of TIFF files in FEMA's GIS products.

Initial Graphics Exchange Specification (IGES)

Developed in the United States in the early 1980s, IGES has quickly gained a reputation for effectiveness in transferring geometric-based data (such as engineering drawings). Today, IGES is used throughout the world in a number of industrial applications. IGES standardizes the representation of specific types of complex graphical objects for data interchange. IGES is intended for platform-independent exchange of complex engineering product data as generated by modern day computer-aided design and manufacturing (CAD/CAM) software.

The IGES standard product data encompasses technical drawings, geometric and non-geometric data (e.g., tolerances), materials and surfaces. IGES software consists of two processing modules: a pre-processor which transforms the native CAD system format into the neutral IGES format, and a post-processor which performs the translation of IGES format to the target system format. The IGES exchange is highly dependent upon the quality of the IGES translators at the sending and receiving systems. Many systems now allow users to *flavor* their output IGES to take advantage of a specific target system's expectations and capabilities.

The IGES standard has been revised over the years in order to improve its graphical representation power and keep pace with technological advances in the CAD/CAM arena. IGES is widely accepted by CAD/CAM software manufactures as a neutral exchange mechanism. Virtually all major CAD/CAM implementations can generate and interpret IGES files, though there is frequently some inconsistency in the implementations. IGES presents the internationally-accepted alternative to the interchange of engineering drawings via proprietary formats such as AutoCAD. Within the *FEMA IT Architecture*, IGES has the potential to become the preferred open systems method of exchanging engineering drawings; although AutoCAD format is also considered acceptable.

Joint Photographic Experts Group (JPEG)

JPEG is an internationally-accepted standardized compression method for full-color and gray-scale images. JPEG was designed to compress *real-world* scenes such as pictures. JPEG is implemented as part of the JPEG File Interchange Format (JFIF), which is produced by many digital cameras. An alternative industry file format is TIFF (an industry standard format). In actuality, TIFF files may have images compressed using JPEG or CCITT Group 4 or several other compression schema. In general, cartoons and other non-realistic images are not handled well by JPEG. JPEG is a *lossy* method of compression with the result that the output image (after decompressing) is not necessarily identical to the input image (before decompression). Because of this limitation, one would not use JPEG on images requiring precise reconstruction (i.e., CAD drawings, satellite images, maps, etc.). However, on typical images of real-world scenes such as photographs, excellent compression levels can be obtained with no visible change, and amazingly high compression levels are possible if low-quality images are tolerable.

JPEG has long been a standard for photographic types of images, and support for it across industry is extensive. The recent surge in multimedia has also driven manufacturers to develop specialized coprocessors to support JPEG compression and playback. Microsoft incorporated support for JPEG under its Windows 95 operating system. JPEG provides FEMA with a stable, efficient, internationally-accepted, and color-capable standard for photographic quality images. Motion JPEG offers FEMA a method for multimedia storage of submitted videotapes and recordings. JPEG has the potential to become the preferred open systems approach to interchange photographic images. TIFF is considered an acceptable alternative file format.

Motion Picture Experts Group (MPEG)

Motion Pictures Experts Group (MPEG) is a group that meets under ISO to generate standards for multimedia data interchange (i.e., mixed-mode audio and video). In particular, the MPEG standard defines a compressed bit stream. However, the compression algorithms are up to the individual manufacturers, and that is where proprietary advantage is obtained within the scope of a publicly available international standard. An industry-standard alternative to MPEG is the AVI (Audio-Video Interleave) file format, which is integrated into many PC-based multimedia packages.

Unlike JPEG, which primarily condenses information within each frame, the standard developed by the MPEG compresses information between frames, such as a background that doesn't change from frame to frame. Products to support MPEG have been on the market for several years. Public domain viewers for MPEG are now available, though not as widely used in the market place as AVI-based tools. The MPEG standards offer FEMA a wide range of capabilities for handling standard and high-resolution video, audio, and multimedia data in an open, internationally-accepted file format in the future. MPEG can also be used for storing both video and audio submissions, storing multimedia records of a disaster scene, and videoconferencing. MPEG has the potential to become

the preferred open systems approach to interchange audio-video files. AVI file format is considered an acceptable alternative file format.

Virtual Reality Modeling Language (VRML)

Virtual Reality Modeling Language (VRML) is a developing standard for describing an open-platform, independent file format for 3D graphics on the Internet. Similar to the core Web text standard (HTML), VRML encodes computer-generated graphics into a compact format for transportation over the network. With VRML, a user can view the contents of a file--in this case an interactive 3D graphics file--and navigate to other VRML worlds or HTML pages.

VRML is scaleable enabling users to navigate through virtual worlds. In effect, VRML is designed to connect virtual worlds across the global Internet. The VRML standard has recently been embraced by ISO, thus affording FEMA an opportunity to adopt and implement an internationally-accepted approach to representation and interchange of 3-D data. For the purposes of this Architecture, VRML is an excellent candidate to represent real-world scenes such as disaster areas, fire scenes, training environments, etc. The ISO-accepted version of the VRML standard is suggested as a potential open systems approach to representation and rendering of 3-D product model data.

Adobe Portable Document Format (PDF)

The industry PDF standard was developed to make the interchange of formatted documents between differing computing environments as reliable as possible. The standard was once under consideration as a FIPS standard, though it is understood that this effort has basically stalled due to a number of Federal agencies' concerns about PDF having its origins as a proprietary file format. PDF is still very popular as a potential electronic file interchange format in the courts, because PDF does an excellent (though not perfect) job of preserving the *look and feel* of the document being interchanged regardless of the computer, operating system, or application software used to create the original document.

The PDF format describes the final form of any document containing text, graphics, or images. Because PDF files are device- and resolution-independent, they can be rendered on almost all major display and output devices. PDF files can be created from any application that supports the PostScript language. Special application programs can translate the PostScript output into the PDF format and vice versa. Encoded in 7-bit ASCII, the PDF file can be readily compressed to make maximum utility of transmission bandwidth and storage capacity. The Adobe Acrobat Reader is a public domain viewer for PDF files and may be freely distributed. FEMA needs to evaluate potential applications of PDF throughout the enterprise as a mechanism for storing, interchanging, and composing various final form documents. The PDF format is under evaluation as a standard for the interchange of final form documents where the *look and feel* must be

preserved. Additional guidelines for configuring and using Acrobat products will need to be promulgated.

Electronic Data Interchange (EDI) and EDI for Administration, Commerce, and Transport (EDIFACT)

- ANSI X12 family of standards for Electronic Data Interchange (EDI)
- EDIFACT family of standards (EDI for Administration, Commerce, and Transport)
- FIPS Pub 161-1 -- *Electronic Data Interchange*
- SGML/XML implementation on the Web.

Electronic Data Interchange (EDI) -- or Electronic Commerce (EC), as it is sometimes called -- is the application-to-application electronic exchange of business data in a standardized, non-proprietary format. The essence of EDI is that it replaces paper documents with an electronic equivalent of the transmission of data contained in those documents.

Closely related to EDI is Electronic Funds Transfer (EFT), which on the simplest level is the electronic transfer of funds between organizations via their respective banks. The last part of the EFT definition is significant because only the banking system can move funds. All checks and electronic payments must be settled by banks. The most prominent method of EFT is the Automated Clearing House (ACH). Operated by the Federal Reserve and participating banks, the rules and standards for ACH are set by the National Automated Clearing House Association (NACHA), an association in which about 85% of the country's banks participate. The ACH is by far the most popular EFT system, handling more than 1 billion transactions each year.

Within the United States, emerging electronic commerce requirements for integration of traditional EDI with EFT have given rise to new terminology, entitled Financial EDI, or (F)EDI. Financial EDI is the electronic exchange of payment and payment-related remittance information such as payment amount, invoice numbers, discounts, and deductions between trading partners. *Information* is the key part of this definition, because it is the primary distinction between Financial EDI and EFT. Financial EDI entails moving both *information* and *instructions* to the banking system to move funds.

In short, EDI transmissions are machine-readable and transaction-oriented. They are normally intended to be integrated into applications to automatically update an inventory, query a catalog, place an order, track a shipment, expedite a process or inquire on status of an order, trigger a tickler, invoice a customer, or direct payment to a vendor via electronic funds transfer techniques. Insofar as many of these functions must be accomplished in the emergency management environment, ANSI X12 and the international EDIFACT standard have the potential to become FEMA enterprise-wide IT standards. Also, FEMA needs to remain cognizant of emerging trends toward implementation of electronic commerce practices using XML on the Web.

Within the Federal government, FIPS Pub 161 currently establishes policy and procedures for government agencies to implement EDI capabilities. EDI implementation software is widely available. This includes EDI data stream encoders and decoders, data base translation software, automated data base interfaces, graphics user interfaces, encryption and security services, X12/EDIFACT syntax translators, and telecommunications facilities. Software has been developed for all major hardware and software environments including mainframes, PCs (under DOS, Windows, and OS-2), Macintosh, and engineering workstations under UNIX. XML-based software is also rapidly becoming available.

Digital Signature

Digital signatures for electronic documents are designed to replace the roles of handwritten signatures and special seals in paper documents. Digital signatures are strings of bits attached to an electronic document. Generated by the signer, this bit-string is based on both the document's data and the signer's secret password. Digital signatures can be created by using public-key cryptography, in which the signer generates a unique bit pattern by using a private key that only he/she knows. The receiver verifies the authenticity of the signature with a public key, which everyone knows.

Three major proponents have emerged in the area of data encryption and digital signatures for secure communications. These include the following:

1. NIST has proposed a Digital Standard Algorithm (DSA) for the **Digital Signature Standard (DSS).** Adopted in May of 1994 and effective December 1, 1994, (FIPS PUB 186), the DSS uses a private key/public key concept. It will be reviewed every five years in order to assess its continuing adequacy. The algorithm is available free to all agencies. The DSS applies to all Federal departments and agencies for use in protecting unclassified information that is not subject to the Warner Amendment. Since the DSS was announced, a Secure Hash Standard has been approved as FIPS 180. The hash function is used in the signature generation process to obtain a condensed version, called a message digest, of the data that is to be signed. The message digest is input to the DSA in generating the digital signature. Signature verification makes use of the same hash function. FIPS 186 and 180 are suggested for consideration.

2. **RSA** Data Security's (Redwood City, Calif.) Public Key Crypto System has become an industry *de facto* standard. RSA technology gives every user two keys -- one public and one private. Data encrypted by one key can only be decrypted by the other key. RSA is very popular and is suggested for consideration as a potential FEMA enterprise digital signature standard.

3. In addition, **Pretty Good Privacy (PGP)**, a *public domain* algorithm similar to RSA, is widely used on the Internet. PGP can be used to implement a

public/private digital signature using *public domain* or shareware programs widely available on the Internet. More documents are digitally signed on the Internet with PGP than any other competing approach. Thus, FEMA should consider PGP as a potential alternative. As with RSA, the PGP approach is suggested for consideration as a potential FEMA enterprise digital signature standard.

FEMA is cognizant of ongoing Federal efforts to develop a Public Key Infrastructure (PKI) and will continue to track and monitor that effort as an important initiative to implement secure electronic commerce practices in government.

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